AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

Vol. XLII
Number 3

PUBLISHED WEEKLY AT 239 WEST 39TH STREET
NEW YORK, JANUARY 15, 1920

Three dollars a year

Champion Dependable Spark Plugs

The Factor of Safety

An engineer building a bridge allows for extra loads, strains and shocks. So also does the Automotive Engineer when he figures the frame and parts of his car. The additions made for extra loads and strains are classed as the Factor of Safety.

THIS same Factor of Safety can now be obtained in spark plugs also.

Up to a certain point the insulators of the past were safe, but when subjected to unusual strains they were liable to break or become conductors.

Champion Spark Plugs have a Factor of Safety built in their famous "3450" Insulator.

When you decided which spark plug to use in the engine you designed, did you consider Safety Factor?

You surely considered Safety Factor when you figured the frame and parts of the car!

Then why not figure it in connection with spark plugs?

You can get Safety Factor in spark plugs now!

Champion Dependable Spark Plugs have it built in their famous "3450" Insulators.

Champion Spark Plug Co., Toledo, Ohio
Champion Spark Plug Co., of Canada, Ltd., Windsor, Ont.

Overwhelming Importance of The Tribune in Chicago

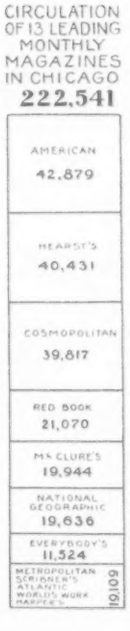
Reaching the Masses

Many an advertiser has hammered away for years in expensive magazine space and secured spotty, unprofitable "national" distribution, only to find that his goods have insignificant sale in great metropolitan markets.

A leading advertiser in national periodicals recently discovered that his goods were sold by less than 300 grocery stores in Chicago. During the past few months a local newspaper campaign prefaced by sales work under direction of The Chicago Tribune Merchandising Service has placed these goods in more than 4000 Chicago groceries.

Multiplication of mediums used results in ***some*** increased circulation but in ***much duplication.*** Even if an advertiser used al the women's periodicals shown, he would not reach 236,111 Chicago families; but he can reach more than 307,412 Chicago families through The Chicago Sunday Tribune.

CIRCULATION OF 14 LEADING WOMENS MAGAZINES IN CHICAGO
236,111
LADIES' HOME JOURNAL 40,592
WOMAN'S HOME COMPANION 37,452
PICTORIAL REVIEW 26,105
BUTTERICK TRIO 21,206
PEOPLE'S HOME JOURNAL 21,147
MR. CALL'S 18,268
TO-DAY'S HOUSEWIFE 17,508
MODERN PRISCILLA 16600
GOOD HOUSEKEEPING 13440
NEEDLE CRAFT, HARPER'S BAZAAR, MOTHER'S MAGAZINE, VOGUE, WOMAN'S WORLD 23,793



Reaching Them With a Punch

Newspaper advertising has more driving power than any other. It is tied up with ***news***—a product so essential that repeatedly the gove nment has recognized newspapers as public utilities.

The Chicago Tribune is a powerful influence in the lives of all the citizens of Chicago. Even when they oppose it, they are keenly interested in what The Tribune does. This cannot be said of any periodical or group of periodicals.

Many a magazine lies unread in the home of the subscriber for days, for weeks, forever; but every copy of The Chicago Tribune is read and read immediately. ***A definite part of every day is set aside for reading The Tribune.*** Every copy breathes action, timeliness, radiates the spirit of "do-it-now," produces ***immediate*** results for advertisers.

Reaching Them at Low Cost

The maximum rate for advertising in The Chicago Sunday Tribune is .0011 per line per thousand of circulation. The corresponding rate for advertising in the periodicals listed on this page averages five times as much.

Newspaper advertising, and particularly Chicago Tribune advertising, reaches the masses, has the punch and is the most economical form of advertising. If you wish to know more about it, a representative from one of the offices listed below will be glad to call on you.

Explanation of Chart

This chart pictures the circulation of various periodicals in the city of Chicago as compared with that of The Chicago Sunday Tribune, and contrasts both with the number of families which make up this market.

Circulation figures for magazines are taken from the Gould chart of the American Association of Advertising Agents. They are at least a year old, but are the best obtainable, as periodicals do not make a practice of publishing their circulation by cities.

The circulation quoted for The Chicago Tribune is taken from the publisher's statement to the Audit Bureau of Circulations for the six months ending September 30, 1919, which showed a circulation of 666,496. The circulation of The Sunday Tribune now exceeds 725,000.

Therefore, although all the publications indicated above, including The Chicago Sunday Tribune, may to-day have circulations greater than those quoted, the fundamental lesson taught by the chart is still true.

The Chicago Tribune

THE WORLD'S GREATEST NEWSPAPER

Tribune Building, Chicago — 512 Fifth Avenue, New York — 406 Haas Building, Los Angeles

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

VOL. XLII NEW YORK—THURSDAY, JANUARY 15, 1920 No. 3

7,523,664 Vehicles Registered in United States During 1919

Net increase of 1,434,909 largest ever recorded—Gain of 23.2% over previous year—One car for every 14 persons. Fees total nearly $65,000,000—$15,000,000 more than in 1918. Registration total climbs over four and a half million during last four years. Production nears pre-war level

THERE are 7,523,664 cars and trucks in the United States to-day, a net increase of 1,434,909 over 1918. This is the highest number that has ever been reached and surpasses all estimates made at the beginning of the year. In view of the present demand for cars, this figure of over seven and one-half millions already in use is particularly significant.

Not only did the total number of cars reach a new mark in 1919, but the increase of 1,434,909 over 1918 is the greatest ever recorded for a single year.

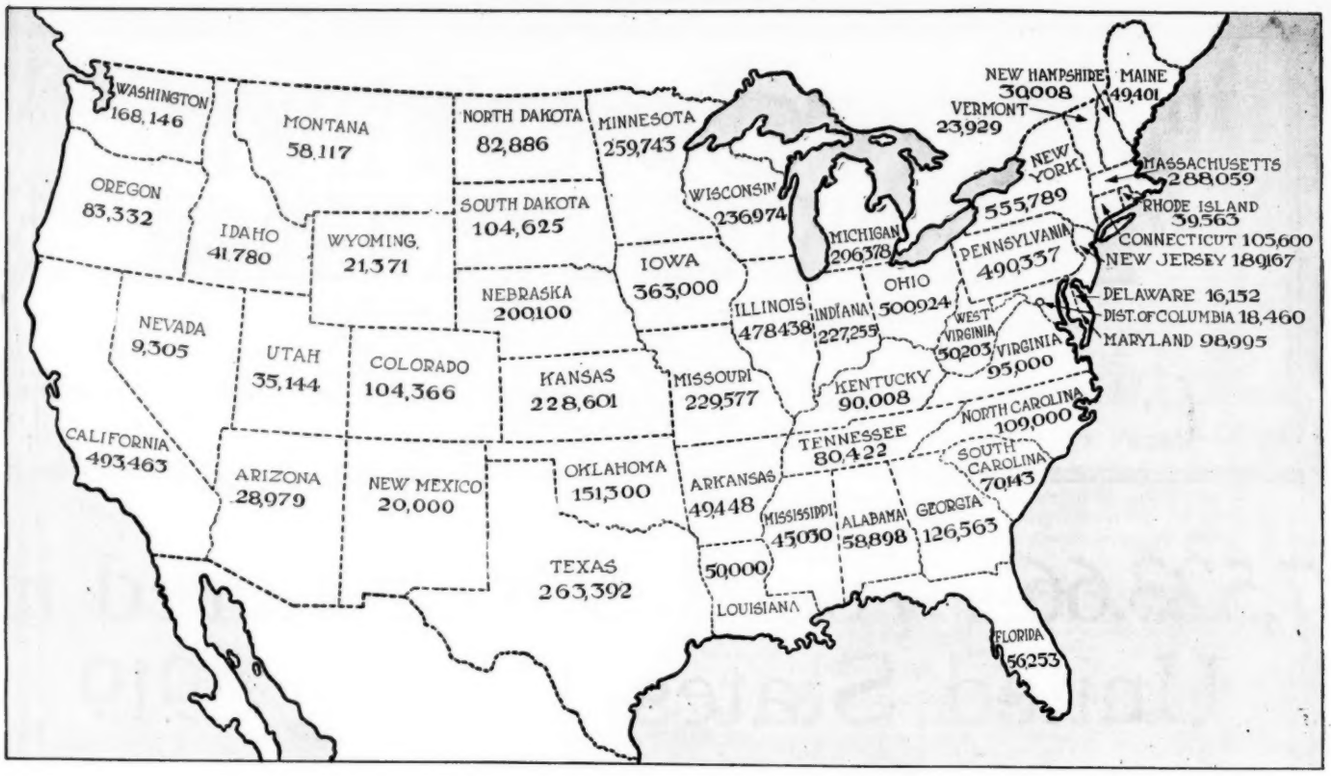
This record marks the fourth consecutive year in which the number of cars in this country has increased more than a million. The average increase for the country was 23.2 per cent. The record since 1913 is as follows:

Year.	Gain.	Gain Per Cent.
1919	1,434,909	23.2
1918	1,004,176	20
1917	1,139,324	39
1916	1,121,164	50
1915	669,218	38
1914	501,536	40
1913	243,521	24

Nearly $65,000,000 in fees were paid during 1919 by the automobile owners of the United States. A road authority stated recently that 95 per cent of the registration fees paid in the various States goes annually toward the building and maintenance of good roads. Thus the motorists of this country have contributed about $62,750,000 during the past year toward good roads.

The sum paid to the various States as fees during 1919 exceeds by nearly $15,000,000 the figures for the previous year. The exact totals and the figures for the individual States will be found in the accompanying table.

The rapidity with which manufacturers readjusted themselves to peace-time conditions, changing from war work to a commercial production basis, is strikingly illustrated by the production figures for 1919. 1,891,929 cars and trucks were produced in the United States during 1919, a gain of nearly 700,000 over the war year 1918, and only slightly behind 1917 when 1,938,778 vehicles were produced. This figure is especially significant when the difficulties of readjustment are considered, coupled with labor troubles and shortage of materials.



Production and Export

When it is considered that the increase in registration, 1,434,909, in comparison with the year's production, 1,891,929, gives only a difference of 457,020, and of this difference 84,000 cars and trucks were exported, the shrinkage of scrapped and otherwise lost cars is very small. Every year a large number of cars become superannuated and are relegated to the junk pile, but last year, owing to the shortage, everything that could run was kept and used.

It is conservatively estimated that the demand now existing is well over 2,000,000. Spring will greatly augment this demand, so that the production prophesied, 2,250,000 cars, could be readily absorbed in this country alone. But American makers will set aside a considerable percentage of their product for export, as the opportunity now existing to build up a big and lasting export business will not be overlooked. The exports of next year will be much larger than this year's, so that it is doubtful if a much greater gain in the total cars registered will be found next year. Studying the registration situation always brings up thoughts of the phantom saturation point which has been discussed from time to time. A strange part of this is that the more cars we have the less is the saturation point discussed and the farther it seems away. We could stand under present conditions from 12,000,000 to 15,000,000 cars in this country. With improved conditions there is no possibility of estimating how many we could utilize.

New York Leads Again

After resigning the lead in total number of registrations to Ohio, at the mid-year mark, New York has again come out in front with 555,789 cars, pushing the Buckeye State to second place, with a net registration of 500,924. California passed Pennsylvania and Illinois, and now stands third. The biggest drop is that taken by the District of Columbia as a result of the exodus of war

Number of Persons per Car Dec. 31, 1919

State	Pop.	Cars and Trucks	Pop. per Car
Iowa	2,224,771	363,000	6.12
California	3,209,792	493,463	6.5446
Nebraska	1,309,627	200,100	6.5448
South Dakota	753,897	104,625	7.20
Kansas	1,896,520	228,601	8.25
Montana	499,816	58,117	8.60
Minnesota	2,378,128	259,743	9.15
Wyoming	195,791	21,371	9.16
Arizona	280,280	28,979	9.66
North Dakota	817.554	82,886	9.86
Colorado	1,040,842	104,366	10.00
Washington	1,723,757	168,146	10.25
Indiana	2,872.842	277,255	10.35
Ohio	5,335,543	500,924	10.65
Michigan	3,173,089	296,378	10.70
Wisconsin	2,580,800	236,974	10.89
Oregon	914,493	83,332	10.97
Idaho	478,356	41,780	11.44
Connecticut	1,307,163	105,600	12.37
Nevada	118,745	9,305	12.76
Delaware	218,722	16,152	13.14
Utah	463,431	35,144	13.18
Illinois	6,400,473	478,438	13.38
Massa.	3,889,607	288,059	13.50
Maryland	1,395,405	98,995	14.19
New Hamp.	448,274	30,008	14.93
Missouri	3,467,401	229,577	15.10
Vermont	367,439	23,929	15.35
Maine	787,042	49,401	15.93
Oklahoma	2,465,402	151,300	16.29
Rhode Is.	648,964	39,563	16.40
New Jersey	3,146,547	189.167	16.63
Florida	961,569	56 253	17.09
Texas	4,687,136	263,392	17.79
Penna	8,936,091	490,337	18.22
New York.	10,833,795	555,789	19 49
Dist of Col.	379,886	18,460	20.57
New Mexico.	450,381	20 000	22 51
No. Carolina	2,497,668	109,000	22 91
Georgia	2,975,394	126,563	23.50
Virginia	2,255,036	95,000	23.73
So. Carolina.	1,678,664	70,143	23.93
Kentucky	2,423,001	90,008	26.91
Tennessee	2,337,879	80,422	29.07
W. Virginia.	1,465,729	50.203	29.19
Arkansas	1,819,587	49,488	36 79
Louisiana	1,912,603	50,000	38.25
Alabama	2,426,602	58,898	41.20
Mississippi	2,026,361	45,030	45.00
U. S.	106,877,895	7,523,664	14.20

REGISTRATION OF CARS, TRUCKS AND MOTORCYCLES, DECEMBER 31, 1919

State or Territory	Gross Car and Truck Registration	Non-Resident and Re-registration	Net Car and Truck Registration	Gasoline Passenger Cars	Gasoline Commercial Cars	Motor-cycles	Chauffeurs and Operators Registered	Total Fees
Alabama	58,898	.....	58,898	48,649	10,249	1,103	.....	$471,000
Arizona	28,979	.....	28,979	.....	.....	596	.....	164,747
Arkansas	49,448	.....	49,448	.....	.....	.....	.....	494,480
California	493,463	.....	493,463	.....	.....	28,038	726,219	4,468,722
Colorado	104,366	.....	104,366	.....	.....	3,268	.....	491,009
Connecticut	105,600	.....	105,600	83,500	22,100	4,450	.....	1,540,724
Delaware	16,152	.....	16,152	.....	.....	690	19,725	286,329
District of Columbia	28,940	10,480	18,460	15,332	3,128	468	6,028	146,515
Florida	56,253	.....	56,253	49,014	7,239	1,416	2,010	360,000
Georgia	126,563	.....	126,563	117,313	9,250	1,528	4,103	417,096
Idaho	41,780	.....	41,780	.....	.....	572	928	729,363
Illinois	478,438	.....	478,438	.....	.....	10,988	53,123	3,265,083
Indiana	277,255	.....	277,255	.....	.....	8,996	6,510	1,558,740
Iowa	363,000	.....	363,000	.....	.....	3,080	.....	2,750,000
Kansas	228,601	.....	228,601	.....	.....	3,589	.....	1,150,183
Kentucky	90,008	.....	90,008	80,903	9,105	1,502	7,500	529,710
Louisiana	50,000	.....	50,000	.....	.....	.....	.....	300,000
Maine	53,424	4,023	49,401	47,632	5,792	1,604	66,131	685,335
Maryland	98,995	.....	98,995	87,989	8,806	5,872	136,216	1,746,414
Massachusetts	288,059	.....	288,059	234,755	53,304	13,831	78,886	3,252,328
Michigan	325,813	29,435	296,378	288,708	37,105	7,875	934,319	3,522,069
Minnesota	259,743	.....	259,743	.....	.....	6,389	6,600	1,296,870
Mississippi	45,030	.....	45,030	42,660	2,370	2,370	.....	330,000
Missouri	244,427	14,850	229,577	.....	.....	4,131	23,811	1,725,077
Montana	59,312	1,195	58,117	.....	.....	847	1,750	406,573
Nebraska	200,100	.....	200,100	.....	.....	2,500	.....	275,000
Nevada	9,305	.....	9,305	.....	.....	155	.....	47,550
New Hampshire	30,008	.....	30,008	.....	.....	2,680	38,911	515,000
New Jersey	189,167	.....	189,167	169,849	19,318	11,377	249,704	2,841,048
New Mexico	20,000	.....	20,000	.....	.....	300	.....	115,000
New York	555,789	.....	555,789	440,043	115,746	27,988	176,466	5,881,623
North Carolina	109,000	.....	109,000	.....	.....	1,455	.....	1,280,000
North Dakota	82,886	.....	82,886	.....	.....	903	.....	636,764
Ohio	516,225	15,301	500,924	.....	.....	20,444	.....	2,680,000
Oklahoma	151,300	.....	151,300	.....	.....	.....	.....	1,208,594
Oregon	83,332	.....	83,332	.....	.....	3,570	3,152	602,064
Pennsylvania	490,337	.....	490,337	449,444	40,893	25,760	245,233	5,090,645
Rhode Island	39,563	.....	39,563	32,411	7,152	2,967	49,365	175,000
South Carolina	70,143	.....	70,143	.....	.....	869	.....	389,035
South Dakota	104,625	.....	104,625	.....	.....	888	.....	300,000
Tennessee	80,422	.....	80,422	.....	.....	1,133	.....	500,000
Texas	329,700	66,358	263,392	.....	.....	3,872	25,474	2,601,478
Utah	35,144	.....	35,144	.....	.....	.....	1,122	291,349
Vermont	26,807	2,878	23,929	24,450	2,400	800	33,597	460,191
Virginia	95,000	.....	95,000	.....	.....	2,420	.....	800,000
Washington	168,146	.....	168,146	.....	.....	.....	.....	2,291,264
West Virginia	50,203	.....	50,203	.....	.....	994	5,544	862,557
Wisconsin	236,974	.....	236,974	226,094	10,880	7,223	.....	2,468,732
Wyoming	21,371	.....	21,371	.....	.....	.....	.....	102,115
TOTALS	7,668,094	144,520	7,523,664	2,438,746	364,837	231,501	2,902,487	$64,503,376

workers. It now stands in 47th place, just three from the bottom. Although its fiscal year runs from July 1 to July 1, all cars now actually in the District were compelled to register, so that the figures presented are the most satisfactory obtainable.

Only seventeen States register cars and trucks separately, so that the actual number of each is difficult to determine with any degree of accuracy. In those States which do differentiate, however, there were 2,438,746 passenger cars and 364,837 trucks. These figures indicate that about 15 per cent of the motor vehicles in the United States are trucks or cars used exclusively for commercial purposes. Figuring on this basis, there are probably about 1,128,543 trucks in ths country to-day.

Increase in Per Cent

North Carolina showed the greatest percentage of increase, with 49.3 per cent. Massachusetts followed with a gain of 48.9 per cent. Two States, Mississippi and the District of Columbia, showed a decrease, the former going back 7 per cent and the latter 39.5 per cent.

The State of Iowa shows the greatest numerical increase with 108,538 more cars last year than in 1918. New York and Pennsylvania stand second and third respectively, each showing a gain about twice as large as their gain for the previous year. Mississippi, on the face of the registration, has 3,370 less cars than during 1918, but the registration there is by counties and probably is defective. The District of Columbia has 12,030 less. Ohio, which lead in numbers gained during 1918, kept pace with her former record, gaining 88,149 during 1919, as against 83,770 during 1918. The increasing gains of several other States, however, set Ohio back into sixth place.

Out of the five States having the greatest percentage of gain, five are predominantly agricultural and five manufacturing. In point of actual numerical gain, however, only one agricultural State finds its place among the first ten. That State is Iowa, which leads the entire list by a majority of about 12,000. This fact places Iowa in a unique position as an automobile State.

Car For Every Six Persons

Iowa gains distinction from the 1919 figures in another respect as well. It has more cars in proportion to its population than any other State.

There is a vehicle in Iowa for every 6.12 persons. California stands second in the number of cars in proportion to population, having made a surprising jump from 11 in 1918 to 6.54 last year, thus nosing out Ne-

braska, which led in July by a very small fraction. California's interesting rise in this respect can probably be attributed to the peculiar nature of the city of Los Angeles. This city is one of the largest in the United States as regards area, its homes and business places spreading out over exceptionally large tracts. As a result, with its growing population, it offers probably greater possibilities for increasing its number of automobiles than does any other urban area in the country.

Cars and Trucks in the United States December 31, 1919

New York	555,789
Ohio	500,924
California	493,463
Pennsylvania	490,337
Illinois	478,438
Iowa	363,000
Michigan	296,378
Massachusetts	288,059
Indiana	277,255
Texas	263,392
Minnesota	259,743
Wisconsin	236,974
Missouri	229,577
Kansas	228,601
Nebraska	200,100
New Jersey	189,167
Washington	168,146
Oklahoma	151,300
Georgia	126,563
North Carolina	109,000
Connecticut	105,600
South Dakota	104,625
Colorado	104,366
Maryland	98,995
Virginia	95,000
Kentucky	90,008
Oregon	83,332
North Dakota	82,886
Tennessee	80,422
South Carolina	70,143
Alabama	58,898
Montana	58,117
Florida	56,253
West Virginia	50,203
Louisiana	50,000
Arkansas	49,488
Maine	49,401
Mississippi	45,030
Idaho	41,780
Rhode Island	39,563
Utah	35,144
New Hampshire	30,008
Arizona	28,979
Vermont	23,929
Wyoming	21,371
New M xico	20,000
District of Columbia	18,460
Delaware	16,152
Nevada	9,305
Total	7,523,664

In Iowa, California and Nebraska, each with one vehicle for about every six persons within their boundaries, the entire population could go for an automobile ride at the same time. So in the near future if Gov. Stephens, of California, should invite Gov. Harding, of Iowa, to bring his family of constituents out for a visit and pick up Gov. McKelvie, of Nebraska, and his constituents on the way, the visitors could all be carried to their destination in automobiles without calling for outside assistance, and without troubling about railway strikes, coal strikes, or transportation facilities of any kind. And California could return the visit in like manner.

Throughout the entire United States there is one car for every 14 persons. Last year there was one car for every 18 persons. Thus it is evident that the distribution of motor cars is more than keeping pace with the rise in population.

Reconstructing Cities

The fact of the matter is, we will have to reconstruct our cities to adapt them to automotive conditions. Modern as they are, all our cities to-day are horse cities. They grew up during the horse period and consequently the new method of transportation does not fit in with their development. It is easy to picture what cities would have been, had they grown up as automobile cities. It is probable that the tall office building would have been much scarcer because the annihilation of distance would have made such concentration unnecessary. Every office building would have its garage beneath, sufficient to house the cars of the workers in the building.

The residential sections would have the garages closely connected with houses as they now are in the newer parts of the various towns throughout the country where the new residential developments are all provided for in that respect. In the large cities with millions of people the streets would have been arranged so that the people would not have to walk across the traffic streams. Overhead bridges would conduct them across important thoroughfares, and the automobiles would be able to speed on their way, whirling their human freight to its destination without crawling at a snail's pace with great wastage of precious fuel until they are out of the congested areas.

This is no idle speculation, as the congested condition of the cities is one of the greatest throttles on the sale of cars. Many a city man does not buy a car because he will not pay $50 to $60 a month storage. One of the biggest problems confronting the municipalities of to-day is parking and the protection of the car left in the street. A man cannot come down to his office in New York or Chicago and with safety leave his car while he goes to his office. In addition to the $50 he pays uptown, another $35 at least would have to be added to his monthly storage, or $85 for the mere privilege of having a place where he can go get his car.

Increase in Registration Dec. 31, 1918, to Dec. 31, 1919

Iowa	108,538
New York	96,497
Pennsylvania	96,151
Massachusetts	94,562
Illinois	88,818
Ohio	88,149
California	85,702
Minnesota	55,285
Washington	50,868
Indiana	50,095
Missouri	41,537
Wisconsin	40,721
Kansas	39,438
North Carolina	35,680
Michigan	34,253
New Jersey	33,648
Oklahoma	29,800
Nebraska	26,726
Maryland	24,329
Kentucky	24,114
Virginia	22,772
Georgia	21,887
Colorado	21,122
Oregon	20,008
Connecticut	19,553
Tennessee	17,422
South Carolina	14,651
South Dakota	14,104
Alabama	12,727
Texas	12,274
West Virginia	11,453
North Dakota	10,573
Louisiana	10,000
Idaho	9,491
Maine	9,029
Arkansas	7,990
Montana	7,064
Wyoming	5,171
New Hampshire	5,110
Arizona	4,884
Rhode Island	4,345
Delaware	3,157
Utah	2,871
New Mexico	2,351
Florida	2,067
Vermont	1,376
Nevada	1,146
Mississippi	—3,370
District of Columbia	—12,030
Total Increase	1,434,909

Registration of Cars and Trucks for Eight Years

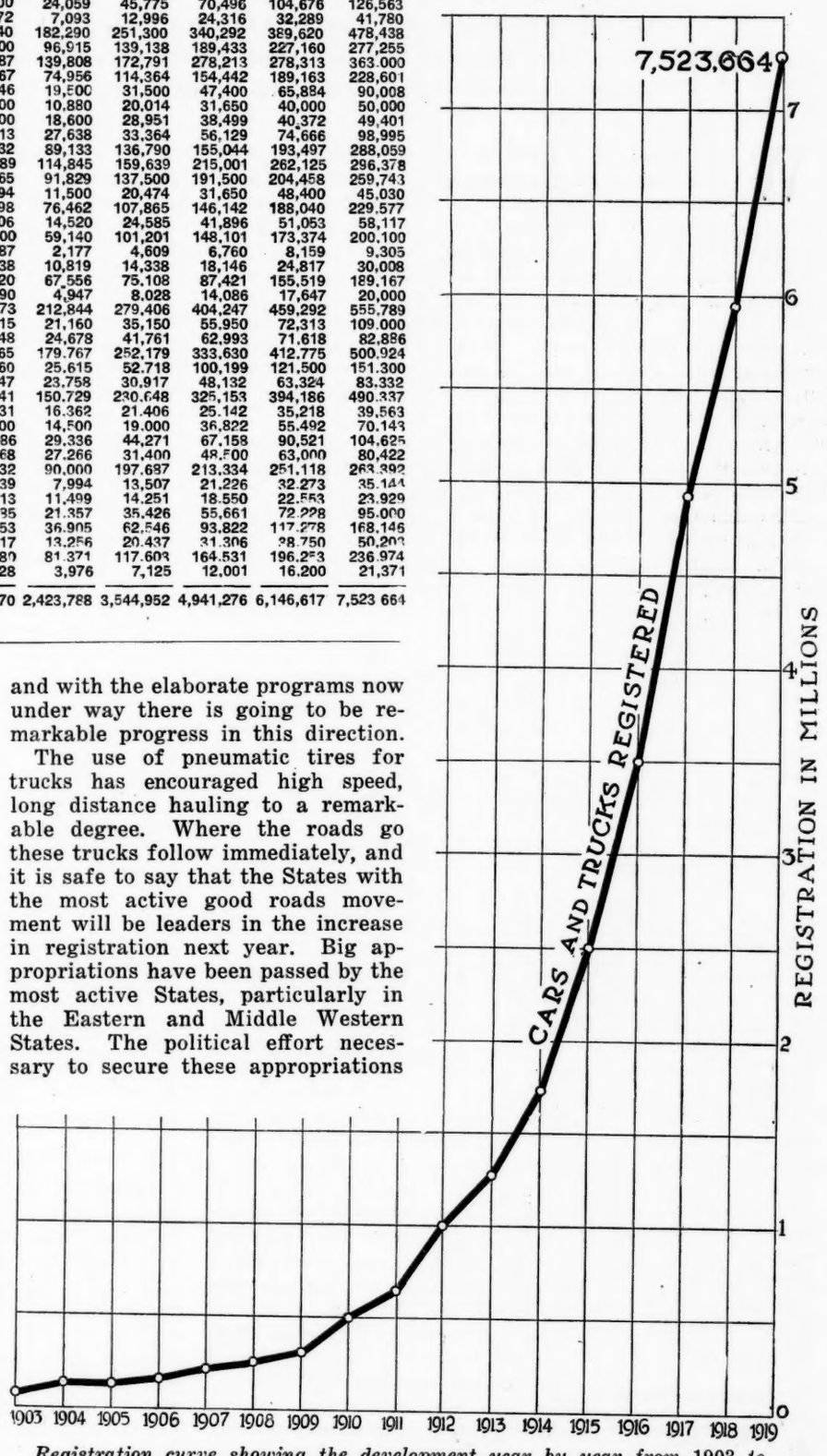
	Dec. 31, 1912	Dec. 31, 1913	Dec. 31, 1914	Dec. 31, 1915	Dec. 31, 1916	Dec. 31, 1917	Dec. 31, 1918	Dec. 31, 1919
Alabama	3,385	5,435	8,425	13,798	22,354	32,873	46,171	58,898
Arizona	1,624	3,445	4,774	7,320	12,122	19,890	23,905	28,979
Arkansas	2,250	3,000	5,642	8,021	14,704	28,862	41,458	49,488
California	88,699	60,000	123,101	163.801	212.918	243,116	407,761	493,463
Colorado	8,950	13,000	17,951	26,611	44,180	66,850	83,244	104,366
Connecticut	17,950	23,263	26,218	38,950	56,048	74,642	86,067	105,600
Delaware	1,732	2,373	2,894	4,924	7,520	9,655	12,955	16,152
District of Columbia	11,902	15,625	8,000	10,200	13,118	21,198	30,490	18,460
Florida	6,749	8,372	11,366	13,123	14,220	39,216	54,186	56,253
Georgia	19,120	18,500	20,800	24,059	45,775	70,496	104,676	126,563
Idaho	2,500	2,173	3,272	7,093	12,996	24,316	32,289	41,780
Illinois	68,073	94,656	131,140	182,290	251,300	340,292	389,620	478,438
Indiana	54,334	44,738	65,500	96,915	139,138	189,433	227,160	277,255
Iowa	47,188	70,294	106,087	139,808	172,791	278,213	278,313	363.000
Kansas	22,000	34,366	50,467	74,956	114,364	154,442	189,163	228,601
Kentucky	5,147	7,210	11,746	19,500	31,500	47,400	65,884	90,008
Louisiana	7,000	7,200	3,500	10.880	20,014	31,650	40,000	50,000
Maine	7,743	10,570	14,300	18,600	28,951	38,499	40,372	49,401
Maryland	10,487	14.254	20,213	27,638	33.364	56.129	74,666	98,995
Massachusetts	51,229	60,826	76,832	89,133	136,790	155,044	193,497	288,059
Michigan	39,579	54,366	76,389	114,845	159,639	215,001	262,125	296,378
Minnesota	29.000	37,800	67,365	91,829	137,500	191,500	204,458	259,743
Mississippi	2,895	3,000	3,894	11,500	20,474	31,650	48,400	45,030
Missouri	24,379	38,140	50,998	76,462	107,865	146,142	188,040	229.577
Montana	2,000	5,686	10,706	14,520	24,585	41,896	51,053	58,117
Nebraska	33,861	47,274	50,000	59,140	101,201	148,101	173,374	200,100
Nevada	900	1,131	1,487	2,177	4,609	6,760	8,159	9,305
New Hampshire	5,764	7,420	8,738	10,819	14,338	18,146	24,817	30,008
New Jersey	35,439	39,288	58,820	67,556	75.108	87,421	155.519	189,167
New Mexico	911	1,721	3,090	4,947	8.028	14,086	17,647	20,000
New York	105,546	122,411	156,173	212,844	279,406	404,247	459,292	555,789
North Carolina	6,178	10,000	14.815	21,160	35,150	55.950	72,313	109.000
North Dakota	8,975	12,968	17,348	24,678	41,761	62,993	71,618	82,886
Ohio	63.066	86,054	121,265	179.767	252,179	333,630	412.775	500.924
Oklahoma	6.524	7,934	7,360	25.615	52.718	100,199	121,500	151.300
Oregon	10,165	13.957	16,347	23,758	30,917	48,132	63,324	83.332
Pennsylvania	59.357	76,178	107,141	150.729	230.648	325,153	394,186	490.337
Rhode Island	7.565	9.894	12,331	16.362	21.406	25.142	35,218	39,563
South Carolina	10.000	11,500	15 000	14,500	19.000	36,822	55.492	70,143
South Dakota	14,481	14,578	20,086	29,336	44,271	67,158	90,521	104,625
Tennessee	9,973	14,103	19,668	27.266	31,400	48,500	63,000	80,422
Texas	35,187	54,362	64,732	90.000	197.687	213.334	251.118	263.392
Utah	2,576	4.021	6.139	7,994	13,507	21.226	32.273	35.144
Vermont	4,183	5,430	7,613	11.499	14.251	18.550	22.553	23.929
Virginia	5.760	9.022	13 935	21.357	35.426	55,661	72.228	95.000
Washington	13,990	24,178	30 253	36.905	62,546	93,822	117.278	168,146
West Virginia	5,349	5,088	7,217	13.256	20.437	31.306	38.750	50,203
Wisconsin	24,578	34.646	53.180	81.371	117.603	164.531	196.253	236.974
Wyoming	3,300	1,584	2,428	3,976	7,125	12,001	16.200	21,371
Totals	1,009,513	1,253,034	1,754,570	2,423,788	3,544,952	4,941,276	6,146,617	7,523 664

If he wants to work on his car or wash it, he must take it out in the street to do the work or pay from $2 to $3 for the job.

As far as conditions throughout the country are concerned, there is no part of the United States in which the market is not practically in proportion to the roads and population. In other words, there is no class of population in the country which has not more money to spend than it ever had. The only limitation on sales is that of production and representation. The next few years will be spent by the manufacturers in rearranging their merchandising organizations. This will proceed slowly, because none of the manufacturers care about taking on more dealers than they can supply with sufficient cars to allow the dealer to make money.

In some of the more congested centers where everybody is represented and supplied with cars, it is very possible that something akin to competition may spring up. Throughout the country as a whole there will be delayed delivery and a universal demand. The farmer and suburban dweller offer a market that can hardly be computed. This market will increase with road construction and with the elaborate programs now under way there is going to be remarkable progress in this direction.

The use of pneumatic tires for trucks has encouraged high speed, long distance hauling to a remarkable degree. Where the roads go these trucks follow immediately, and it is safe to say that the States with the most active good roads movement will be leaders in the increase in registration next year. Big appropriations have been passed by the most active States, particularly in the Eastern and Middle Western States. The political effort necessary to secure these appropriations has greatly decreased in the last few years. The farmers who at first were inclined to oppose are now generally the greatest supporters of road movements, and when submitted to a referendum these appropriations have generally been carried by an overwhelming majority.



Registration curve showing the development year by year from 1903 to the end of 1919

Future Production and Its Problems

With the 1919 production estimated at 1,587,000 cars and 305,000 trucks, the expectancy is for a marked increase this year. The industry is now set for real work after putting factories in order following the war activities. Sales and export organizations are receiving much attention during period when demand exceeds supply

WITH astounding rapidity, the automobile industry outstripped all others in getting back to a peace time basis. In spite of the fact that the industry was practically on a war basis Jan. 1, 1919, making possible only a small production during the first three months of recovery, 1,587,000 cars and 305,000 trucks were made during the year. This is only slightly less than 1917, a normal peace time year, when 1,741,000 cars and 128,000 trucks were manufactured. Thus the passenger car business of 1919 may be said to have been practically back to normal and the truck business nearly three times that of the last normal peace time year.

The mere figures of production, however, do not begin to tell the story. In spite of the large output, the supply of cars was far below the demand, and it is conservatively estimated that the year of 1919 has turned over to 1920 an unsupplied demand for 2,000,000 cars. From the motor truck angle, the opening of 1920 sees unfolded the brightest prospects that have ever confronted the business.

Turning our attention to the passenger car industry for the moment, we find that it has become one of the greatest in the world. The output of cars for 1919 was valued, from a wholesale standpoint, at $1,400,000,000, an average of $882 per car. If production had kept pace with demand, the value of the cars produced would have been $3,000,000,000. With cash in hand buyers, both wholesale and retail, were to be found all over the country, and in fact all over the world, waiting for the cars of American manufacture.

Two Big Problems

We open the year 1920 with two big problems. The first, that of production, and the second, of merchandising. The problem of production is governed solely by labor. It is the labor condition which holds up our supply of glass, steel, or other basic materials, without which the automobile cannot be built. Remove this throttle, and production will jump ahead at an amazing rate. The waiting, ready demand keeps moving ahead so rapidly at present that this factor of production overshadows that of merchandising, and yet the day of the latter is so surely coming that only the most short-sighted manufacturer is not making ready and laying his plans for the day when a well organized distribution scheme and personnel is required.

Although at present subdued under the avalanche of demand, both domestic and foreign, the merchandising fabric which was destroyed by war conditions is rapidly being repaired. Intensive selling methods will be back in use, and the country again dotted with the dealers and subdealers, who for mere lack of cars were forced to suspend temporarily.

Vehicles Second to Steel

Returning to the production angle, the automobile industry begins to loom as a candidate for first place among the manufacturing industries of the country. To-day it is second only to steel, and with the great amount of other products involved and the other industries directly and indirectly affected by automobile manufacture it stands to-day as probably the most dominant factor in American life.

Production during 1918 was less than a million cars, due to the necessity of utilizing the materials which enter into the manufacture of the car and the factories that make them for war purposes. During this year there may have been a slight falling off in demand in some directions, but there was an increase in others, and in all probabilities, could the cars have been made, they would have been sold in greater numbers than in 1917, a peace time year. Certainly the effect of the pent-up demand was felt in the spring of 1919, when cars were at such a premium that options on delivery were selling for big prices. The world is scrambling for cars; there is no limit in sight to the demand; therefore every factory is going to utilize every possible effort during 1920 to turn out all the cars it can.

Predict Increased Production

This situation is bound to cause the creation of new concerns. The parts manufacturers are so overcrowded with orders that they cannot, in many instances, take on more orders. The result is that the next year will probably witness a marked increase in the manufacture of parts for sale to the trade. This in turn will cause an increase in the assembled car business and a corresponding augmentation of the volume of the industry.

The prediction of increased production is made unanimously by the executive heads of factories who have made a careful study of this situation. AUTOMOTIVE INDUSTRIES conducted an inquiry among the manufacturers of cars and parts who are most closely in touch with the future market situation and who are reputed to be the closest judges of future conditions. An average of the estimates for the future indicate a production of 2,250,000 cars for 1920, with 200,000 to 300,000 increase per year for five years thereafter. Certain it is that the old bugaboo, commonly termed saturation point, has ceased to be held up with trembling hands by the pessimistic.

The Labor Outlook

All of this production problem, however, depends on the labor conditions. There are no more progressive concerns in the world than the American automobile manufacturers. Taken collectively, there are no industries where the workmen are better paid and more fairly dealt with. The result of this is that the labor union has never become overstrong in the field, and efforts to unionize automobile workers by radical agitators have led to failure and a general distaste for the organizations suggested by these men. The organization started by them has been outlawed by the American Federation of Labor. Like all other industries, that of automobile manufacture has come through a delicate period in 1919, but 1920 is faced with the con-

fidence that the policy of fair dealing uniformly adopted will keep the automobile industry as free as any other from labor trouble. In fact, the general impression is that we are emerging from the period of unrest.

Shortages of coal and steel materially affected production during December. In fact, had the coal situation not cleared up when it did, a serious shut-down would have resulted. As it was many of the factories were compelled to run on part time, and others saved themselves from a complete shutdown by using automobile and other gasoline engines to run their machines.

Production methods have been refined in all of the factories. Those that were engaged in 1918 on war work that closely paralleled their usual lines of work had very little disarrangement in their plants, but practically all of these added to floor space. The factories which went into lines such as airplane and airplane engine manufacture, where it was necessary to tear out the entire pre-war system, had a big task to return to normal production. In every instance advantage of this situation was taken to improve production systems. All the experience of previous car manufacture and the knowledge of methods used in the war work have been combined to increase plant efficiency.

Besides this these concerns also have increased their space to a great extent. The result of these improved methods and the increased plant space is that the industry has a capacity nearly 100 per cent greater than it had in 1917. In 1917 practically every concern was producing to capacity. In 1919 this was not possible, because of the disturbed conditions due to factory disarrangement at the beginning of the year and the shortage of material, both at the beginning of the year and right through to the end.

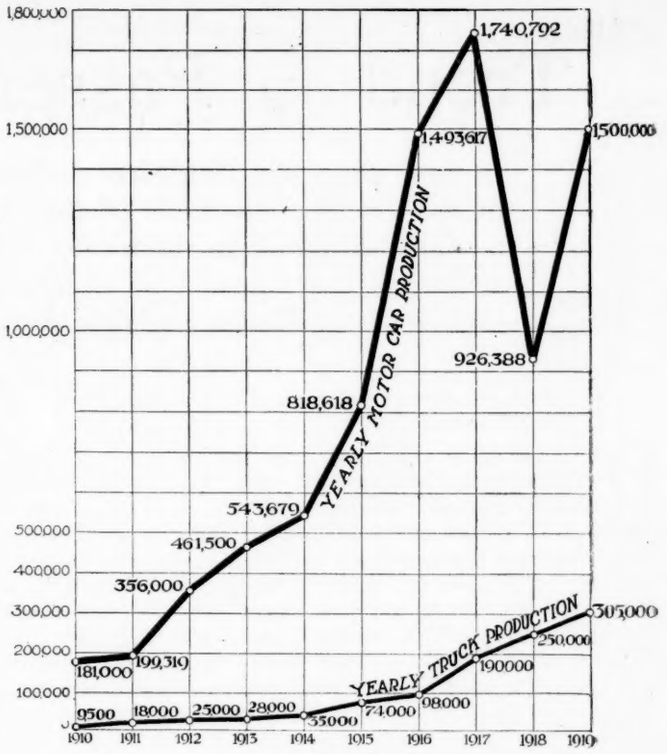
Standardization Effect

All of these conditions materially affect the 1920 production situation. Passenger cars have been standardized by the engineering societies to such a degree that it has made possible an interchange of parts that is not possible in any other field. This feature has been the source of envy and amazement to the European manufacturer, who, in his desire to maintain individuality, had lost sight of the possibilities of great increased national production through standardization. It makes the work of assembling cars for export so much more simple that it is going to be of direct influence in increasing the foreign market for American cars. This foreign demand is so great and the attractions of a world market are so pronounced that all manufacturers have determined to enter the lists for foreign trade. The result of this is that all factories are going to set aside a certain percentage of their production for export regardless of the domestic demand.

This is no more than right. It is a patriotic duty, as a matter of fact, to help the United States to establish its foreign trade, and not the least of our exports during the coming years will be automobiles and parts.

Trucks

The truck industry offers possibilities that bring it, in its particular field, into as great promise as that of the passenger car. During the year 1919 the United States manufactured 305,142 trucks. Production schedules for 1920 call for 430,000 trucks. It is estimated that this will be cut to 370,000 when the final check comes at the end of the year. This drop below the scheduled production will be due to lack of materials, and this in turn largely because of direct or indirect labor influence. The fear that the left-over trucks from the Quartermaster and Motor Transport departments would have a material effect on the market has passed, as far as the manufacturer is concerned.



Passenger car and truck production by years.

A year ago, when we were all making predictions as to the number of trucks to be turned out in 1919, we said that it would amount to not more than 290,000. The prediction was based on the upset conditions of the factories at that time. The quick rally was a surprise to those who are most familiar with the industry, and the actual production exceeded the estimated by 15,000.

Influence of Roads

One of the biggest influences on truck production during the coming years will be the building of good roads. There are $2,000,000,000 available for roads at present. The problem is that of spending the money, not to raise it. There is more money available than can be spent this year. The Government alone for national highways has more than $350,000,000 available, and in addition to this there are the state and county appropriations. Where the good roads go, the trucks follow rapidly. The introduction of the pneumatic tire is going to draw the truck into fields where its growth up to now has been slow. Long distance hauling has not been developed as much as it will be in the future when the average speed of the truck is nearer 25 m.p.h. than 12½ or at most 15, as it is at present.

Larger Uses of Trucks

The use of the motor truck to replace the freight car for certain classes of work has proven a marked success. The number of companies which are going into both urban and interurban transportation is growing day by day. Trucks are operating on railroad schedule, and indeed have proved to be more dependable on a time basis than the steam roads have ever been. There are truck lines that hold their schedules so closely that they start on the dot, regardless of whether they have a load at the time or not. This efficient transportation service is going to pave the way for future truck business to such an extent that we may look to the time when the national means of transportation in this country will be the truck in spite of our great railway mileage.

Trend in Passenger Car Design

In these pages Mr. Heldt has analyzed the trend of design in the cars listed in the specifications table of this issue and he points out such changes as a slight falling off in the number of eight- and twelve-cylinder engines, a decline of the T-head type engine, the continued decline of the gravity fuel feed, and almost complete disappearance of the dual ignition system.

By P. M. Heldt

DESIGNERS are influenced by the examples of their confrères, which explains why there is seldom a sudden change from one practice to another. For instance, for some years we have seen the number of firms using cone clutches gradually declining. So far as is known to us there is no serious fault inherent in the cone clutch and no compelling reason why anyone should give it up. But the representation of the cone clutch this year has fallen from 27.7 to 15.1 per cent, and it is more than likely that the reading of these figures or even of the disappearance of the cone clutch from many car specifications will induce a number of other designers next year to drop the cone type of clutch.

The designer undoubtedly reasons that if one-eighth of all the car designers last year made a change in their clutch type there probably was some rather important reason, and if the knowledge of this fact does nothing more, it will at least induce him to look thoroughly into the merits of the different clutch types. As a matter of fact it is calculated to bias him in favor of the type which made the gains.

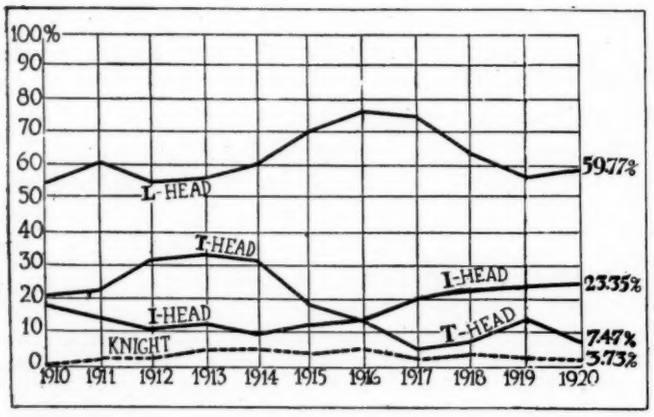
In the past few years we have had a few changes in practice that might be properly characterized as land slides. Three such instances were furnished by the electric starter, the spiral bevel-gear drive and the vacuum fuel feed. There is nothing this year that can quite compare with the rapidity with which these features captured public fancy. The electric starter is found on 99 per cent of the cars, the spiral bevel-gear drive on 90 per cent and the vacuum fuel feed on 87 per cent. Among the more important changes this year may be mentioned that the semi-floating and three-quarter floating type of rear axle are gaining at the expense of the full floating type, and that there has been a moderate increase in the use of pressure feed lubrication as well as in silent chain camshaft drives.

Number of Cylinders

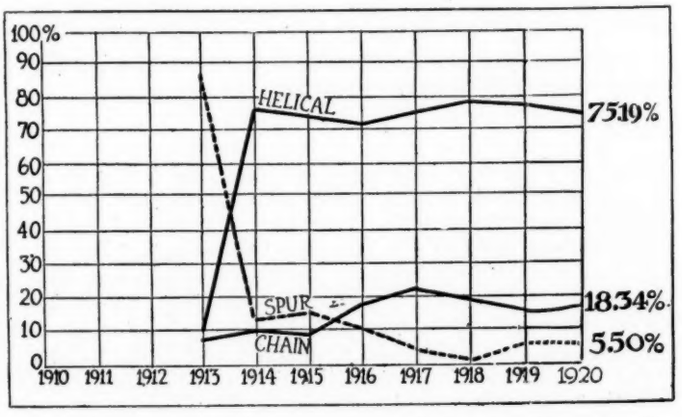
There is no change of any consequence in the representation of the different cylinder numbers. A falling off is noticed in the percentage of both the "eight" and the "twelve," which, though slight, is rather significant, as it would seem to indicate that these types of engines, which were introduced only a few years ago, had reached their zenith. There is, however, one new eight-cylinder type among the cars listed and several others are known to be on the way, so that next year the figures may show a different trend. As the total number of eights and twelves is small, the addition of one or two models, or the discontinuance of some, makes quite a difference.

As regards cylinder types, the T-head is rapidly declining in popularity, and in this respect we are somewhat behind Europe, where, to judge by the recent shows, it has disappeared entirely. Most of the loss of the T-head has been gained by the L-head construction, while some of it has gone to the I-head and some to the F-head, in which latter one valve is centrally in the head and the other in a side pocket.

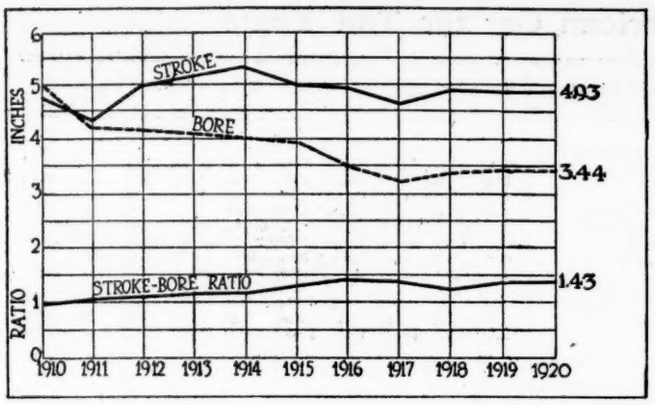
A rather new departure in cylinder construction is embodied in the new Studebaker Six, which has detachable cylinder heads without water jacket. Unjacketed heads in the form either of plain disks or of disks with cooling ribs were used many years ago, but the new feature is the casting of the inlet manifold integral with the head. This will tend to keep the cylinder head cool and at the same time to vaporize the fuel. Heretofore exhaust



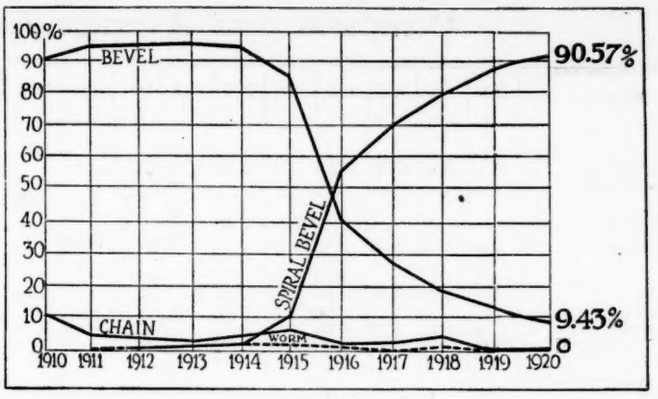
The above diagram shows the trend in cylinder types for the past ten years, the decline of the T-head featuring the past year



There has been no important change in camshaft drives the past year, but the chain drive has gained some



Average bore, average stroke and stroke-bore ratios have attained a state of stability



In final drives the spiral bevel gear has continued to gain at the expense of the straight bevel gear

heat has been largely used for vaporizing the fuel, but under certain conditions, as when running on low throttle, the exhaust temperature is hardly sufficiently high to convert all of the fuel constituents of low volatility, and bringing the gaseous mixture in direct contact with the combustion chamber wall should help.

Bore and Stroke

The average bore and stroke have remained substantially the same as last year, being now 3.44 x 4.93 in. instead of 3.45 x 4.91 in. There remains therefore a slight tendency to increase the stroke-bore ratio.

If a census were taken on the subject it would undoubtedly be found that there has been an increase in the use of pressed steel oil pans. The practice of casting the cylinder head separate makes it advantageous to cast the top half of the crankcase with the cylinder block. The advantages reside in the elimination of machine work, in a more rigid construction with a given amount of material and in simplifying the assembly. Of course, if the top half of the crankcase is made integral with the cylinder block it cannot be particularly light. Therefore it is specially important that the bottom half, which has no heavy strains to bear, should be as light as possible. Successful methods have been developed for effecting oil-tight joints between a cast top half and a pressed steel bottom half, and as the pressed steel part requires no machining, it is undoubtedly somewhat cheaper than its cast equivalent, when made in large enough numbers. For a packing between the two halves cork gaskets are now available, where formally paper gaskets had to be used.

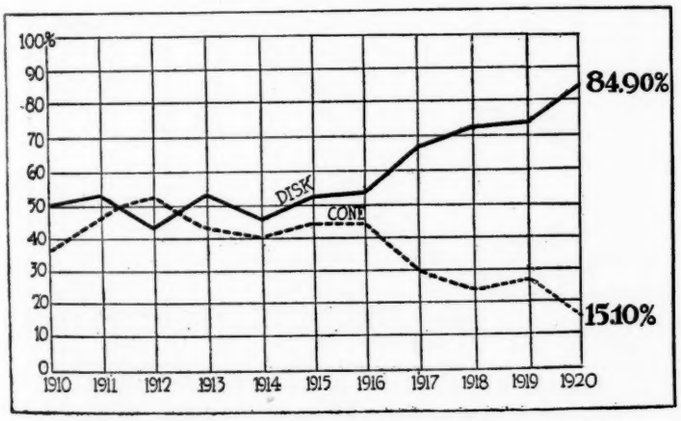
As regards timing gear drives, the most notable change is a moderate increase in the use of the silent chain, from 15.6 to 18.3 per cent. This is really a recovery, for the silent chain drive reached a figure of 21 per cent in 1917, after which it declined in popularity. The difficulty with the early chain drives was that they could not be adjusted for wear, but this deficiency has been overcome. Meanwhile users of helical gear drives are providing spring pressed thrust buttons to take up all end play, which should go a long way toward eliminating the only remaining cause of noise in such gears. A little over 5 per cent of the engines still retain the straight bevel-gear drive. These are probably fairly low speed engines.

Gravity fuel feed is still declining. Only about 5 per cent of the cars now use this system and probably most of these carry the tank in the cowl. Pressure feed, the use of which is about on a level with that of gravity feed, has gained some, as has vacuum feed, the predominant method.

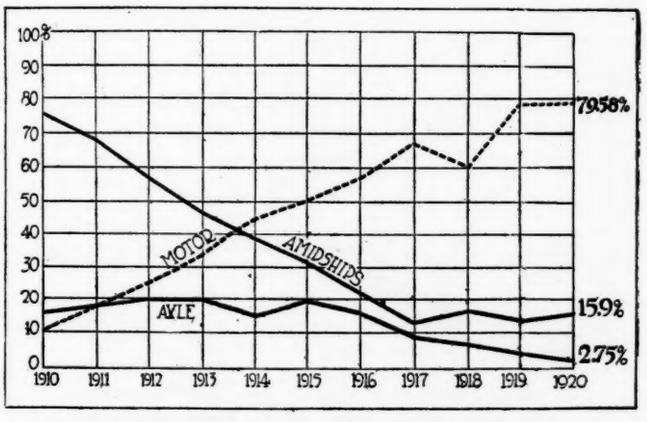
Ignition

The majority of all cars now have a single ignition system, the dual system, so popular ten years ago, having been discarded almost entirely. Of course, the popularity of the dual system was based largely on the aid it gave in starting the engine when the magneto was the chief ignition source. With battery ignition as the main standby, an extra battery of dry cells could serve only for emergency purposes. Now, it seldom happens that a storage battery runs down so far that enough ignition current for starting cannot be obtained from it, and as soon as the engine has picked up its cycle the generator takes care of all ignition requirements and sends a charging current into the battery. Besides, the dry battery rapidly deteriorates, even if not used, and if a set were carried for emergency it would likely be run down when wanted.

Mention has already been made of the fact that the cone



The disk type of clutch, which includes several varieties, is rapidly outdistancing the cone type



The practice of combining the gearset with the rear axle has been almost given up

Comparison of Average American Car for Ten Years

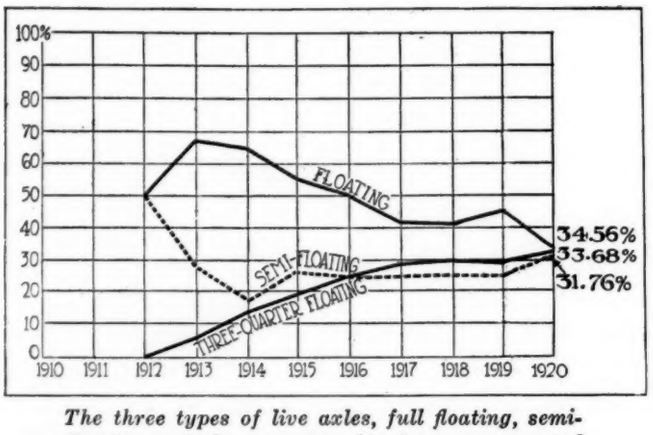
Percentage	1920	1919	1918	1917	1916	1915	1914	1913	1912	1911
ENGINE STARTING										
Electric starter	99.05	99.40	99.40	99.00	98.80	94.50	87.00	37.00	2.00	..
Acetylene starter	..	..	..	..	..	..	1.00	14.00	..	..
Air	..	..	..	..	..	..	4.00	9.00	2.00	1.00
Optional	..	..	..	..	..	1.50	2.00	5.00	..	..
Mechanical	..	..	..	..	..	0.50	1.00	4.00	..	..
No starter stock	0.95	0.60	0.60	1.00	1.20	2.50	5.00	31.00	98.00	99.00
FUEL FEED										
Gravity	5.56	7.80	9.70	18.00	31.80	57.00	58.00	65.00	75.00	81.00
Gravity pressure	..	..	..	1.00	2.40	0.50	1.00	..	..	..
Pressure	7.40	5.90	6.80	7.00	12.00	22.00	41.00	35.00	25.00	19.00
Vacuum	87.04	86.30	83.50	74.00	53.80	20.50	..	..	..	..
TYPE OF CLUTCH										
Disk	84.90	73.30	73.80	68.00	53.40	51.00	48.00	52.00	44.00	51.00
Cone	15.10	27.70	25.64	30.00	45.60	44.00	41.00	45.00	52.00	47.00
Expanding band	..	..	..	..	..	0.50	3.00	1.00	3.00	2.00
Contracting band clutch	..	..	..	..	..	4.50	5.00	2.00	1.00	1.00
None	..	..	..	1.00	..	..	3.00	..	..	..
Electric	..	..	..	1.00	1.00	..	..	..	..	..
LOCATION OF GEARSET										
Amidship	15.90	14.90	17.60	14.00	20.60	32.50	39.00	46.00	55.00	67.00
Unit with axle	1.77	4.90	7.37	9.00	15.30	18.20	15.00	20.00	20.00	17.00
Unit with engine	79.58	79.30	71.20	77.00	63.50	49.30	43.00	34.00	35.00	16.00
None	..	..	..	..	..	..	3.00	..	..	..
Unit with torque tube	2.75	..	..	..	..	..	..	..	..	..
FINAL DRIVE										
Shaft and bevel	9.43	13.70	18.32	28.00	41.00	84.50	93.00	94.00	92.00	91.00
Chain	..	..	1.70	1.50	1.70	4.50	4.00	4.00	6.00	8.00
Shaft and worm	..	..	0.56	0.50	0.50	1.50	1.00	1.00	1.00	..
Roller	..	..	..	..	..	..	1.00	1.00	1.00	1.00
Shaft spiral bevel	90.57	86.30	79.42	70.00	56.80	9.50	1.00	..	..	..
TYPE OF AXLE										
Floating	34.56	45.00	42.35	43.50	51.80	56.50	65.00	67.00	50.00	..
Semi-floating	33.68	26.00	26.00	25.50	23.60	23.00	17.00	26.00	49.00	..
Three-quarter	31.76	29.00	30.50	29.50	22.80	18.50	14.00	4.00	..	..
Seven-eighths	..	..	..	..	..	..	1.00	..	..	..
Dead	..	..	1.15	1.50	0.60	2.00	3.00	3.00	1.00	..
TIMING GEAR DRIVE										
Spur gear	5.50	5.90	2.27	4.00	8.40	16.10	13.00	83.00	..	..
Helical or spiral	75.19	78.40	79.00	74.00	73.00	73.70	77.00	10.00	..	..
Silent chain	18.34	15.60	17.60	21.00	18.10	9.10	10.00	7.00	..	..
Worm	0.97	..	..	1.00	0.50	1.10	..	..	..	..
Bevel	..	..	1.13	..	..	..	..	..	..	..

General Averages	1920	1919	1918	1917	1916	1915	1914	1913	1912	1911
Horsepower, S. A. E. rating	26.45	28.00	27.40	24.30	28.66	29.97	33.20	33.60	33.60	32.70
Bore	3.44	3.45	3.43	3.37	3.57	3.82	4.12	4.19	4.34	4.42
Stroke	4.93	4.91	4.94	4.66	4.97	5.10	5.28	5.15	4.97	4.46
Stroke bore ratio	1.43	1.42	1.25	1.38	1.39	1.33	1.28	1.23	1.09	1.01
Displacement	257.16	267.80	269.00	222.50	278.87	307.38	349.00	345.00	316.20	313.20
Wheelbase	120.60	120.60	120.70	113.25	119.56	122.19	121.00	122.00	121.00	114.00
Gear ratio	4.38	4.36	4.22	4.15-1	4.08-1	3.88-1	3.6-1	3.57-1	3.62-1	..
Tires	32x4	32x4	34x4	31x4	23x4½	34x4	35x4½	35x4½	35x4	34x4
Number cars	..	..	..	..	519	535	607	..	..	..
Number chassis	110	93	180	188	176	200	236	339	381	393
Number makes	92	85	125	131	108	119	133	156	193	270
Price	$2537	$2226	$1822	$1687	$1600	$2005	$2635	$2585	$2508	$2560
PERCENTAGE										
NUMBER OF CYLINDERS										
One cylinder	..	..	..	..	..	..	..	..	1.00	1.00
Two cylinders	0.91	..	..	..	..	0.50	1.00	1.00	1.00	2.00
Four cylinders	30.26	29.50	34.61	37.00	39.20	51.00	54.00	62.00	78.00	80.00
Five cylinders	..	..	..	..	..	..	..	1.00	1.00	..
Six cylinders	56.85	55.80	51.76	47.00	45.80	47.50	45.00	36.00	19.00	17.00
Eight cylinders	9.22	11.70	10.22	12.00	12.60	1.00	..	..	..	..
Twelve cylinders	2.75	2.90	3.41	4.00	2.40	..	..	..	..	..
SHAPE OF CYLINDERS										
I cylinder type	23.35	22.50	22.20	20.00	13.70	16.50	30.00	31.00	30.00	22.00
L-head	59.77	56.90	63.50	73.00	73.30	70.00	59.00	56.00	55.00	60.00
T cylinder type	7.47	12.70	6.80	5.00	13.00	8.50	6.00	9.00	9.00	14.00
Knight type	3.73	3.90	4.00	2.00	3.60	3.00	3.00	3.00	2.00	1.00
Two cycle	..	..	..	..	..	1.00	1.00	1.00	4.00	3.00
Gasoline electric	..	1.00	..	..	1.00	..	..	..	..	..
H	..	..	2.30	..	..	..	..	..	..	..
F	5.68	3.90	1.20	..	..	..	..	..	..	..
COOLING										
Air cooled	2.75	1.90	0.60	1.00	0.60	0.50	2.00	4.00	5.00	6.00
Thermo syphon	29.34	31.00	32.40	38.00	38.20	27.00	19.00	17.00	19.00	28.00
Pump circulating	67.85	67.10	67.00	61.00	61.20	72.50	79.00	79.00	76.00	66.00
IGNITION SYSTEMS										
Single ignition	90.00	88.20	91.04	84.00	76.00	56.00	23.00	15.00	14.00	18.00
Dual ignition	2.70	6.80	2.14	9.00	19.20	36.00	59.00	68.00	63.00	53.00
Double	3.60	2.90	5.12	3.00	1.80	4.55	11.00	15.00	23.00	29.00
Duplex	..	1.90	0.56	3.00	1.80	2.00	3.00	..	..	..
Dual-double	1.80	..	..	..	..	..	..	..	..	..
Two-point	0.90	..	..	..	..	..	..	..	..	..
ENGINE LUBRICATION										
Splash oiling	23.15	31.40	57.00	35.00	52.70	46.50	42.00	53.00	68.00	81.00
Splash pressure	43.52	39.20	21.60	35.00	23.35	16.00	39.00	32.00	20.00	..
Pressure oiling	33.33	29.40	26.70	30.00	23.35	37.50	18.00	14.00	10.00	19.00

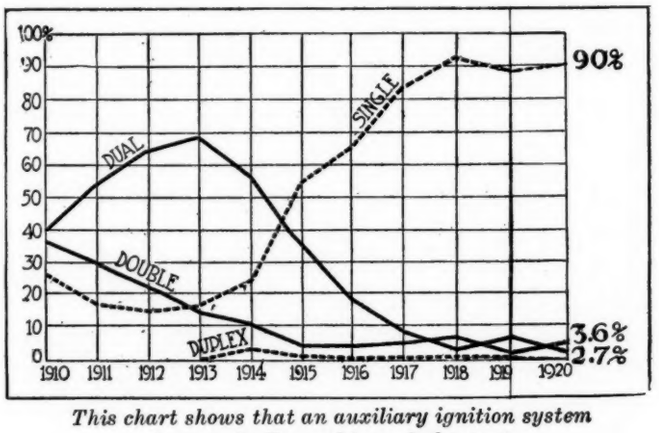
clutch is rapidly losing. All of the gain has been made by the disk clutch, the cone and disk being the only two types now in use on passenger cars. As regards gearsets, the most notable change is that the number built in a unit with the rear axle has materially decreased.

Practically 80 per cent of the cars now have unit power plants and about 16 per cent have the gearset amidships, or about 19 per cent if those cars in which the torque tube is built rigidly together with the gearbox are counted in. The advantage of having the gearbox mounted rigidly on the forward end of the torque tube is that no universal joint is required in the propeller shaft. Only one of these joints is needed in the shaft between the engine and transmission, and that can be comparatively light, as it will never have to transmit more than the maximum torque of the engine. On the other hand, the heavy weight at the forward end of the torque tube, which must be supported in a spherical bearing, is a disadvantage, as is the variation of the sliding rod position relative to the body, as a result of spring play.

Final drive is now approximately 90 per cent by spiral bevel gear and the remaining 10 per cent by straight bevel gear. There has been a rather sharp change in the axle situation, the full floating type of axle having lost considerable ground, mainly to the semi-floating type, but also somewhat to the three-quarter floating axle.



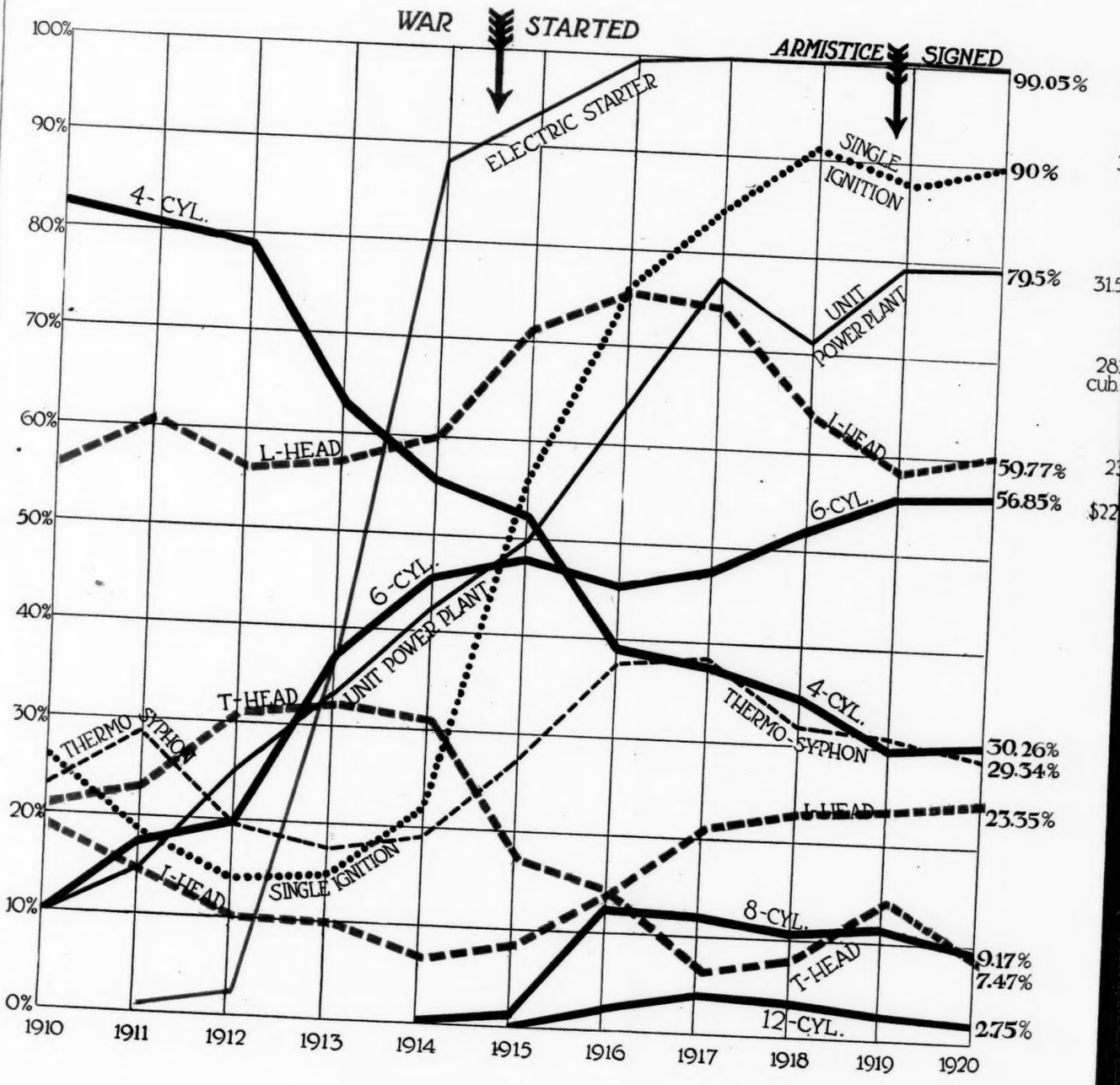
The three types of live axles, full floating, semi-floating and three-quarter floating are now used in almost equal numbers



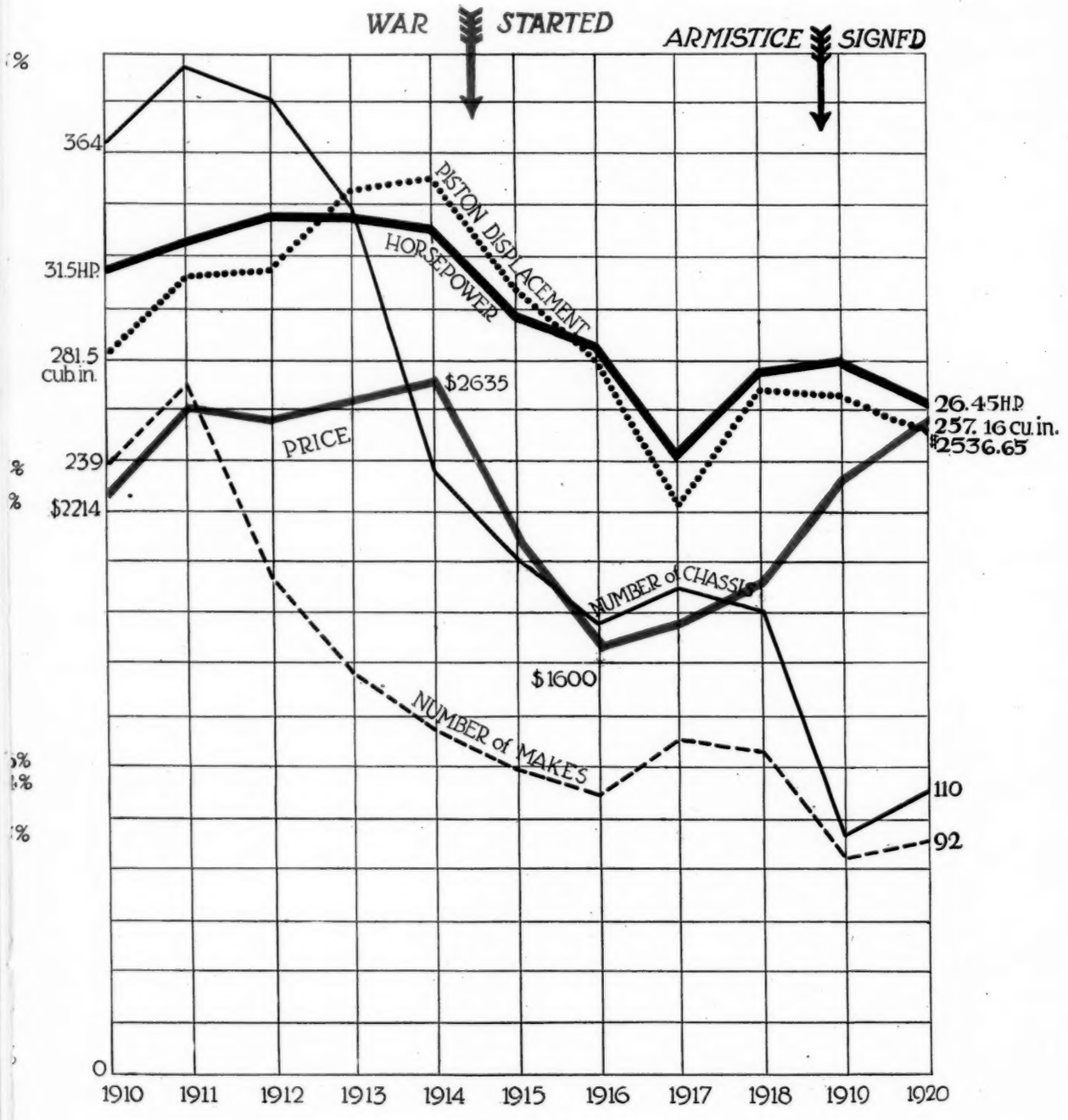
This chart shows that an auxiliary ignition system is practically a thing of the past

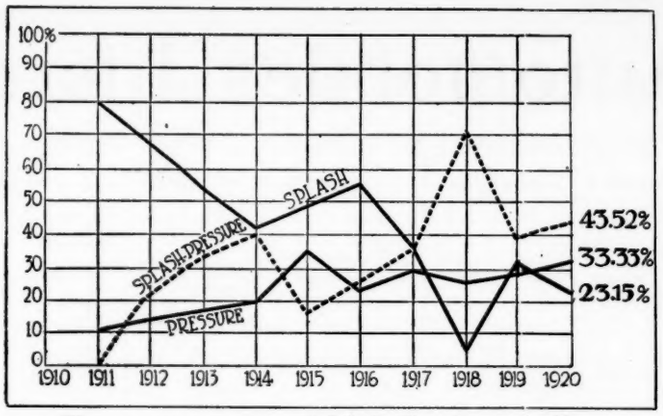
Supplement to AUTOMOTIVE INDUSTRIES
AUTOMOBILE

Trends of the American Automobile for 1
Most Important Factors in Des

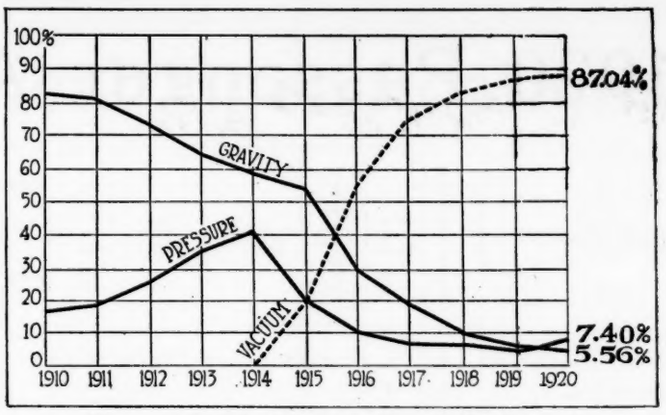


or 11 Years, Showing Variations of Design and Manufacture





The pressure system of lubrication is gradually gaining while the plain splash system is losing as consistently



Vacuum fuel feed is now the standard practice. The gravity feed system has been surpassed even by the pressure system

The average A.L.A.M. hp. has decreased somewhat since last year, while the average wheelbase has remained the same. But owing to the general increase in the speed of engines it is more than likely that the cars have at least the same ability as last year. This increase in engine speed is reflected by the increase in gear ratio, which, however, has been only very slight, from 4.36 to 4.38.

We have also investigated the situation with respect to the proportional numbers of the different components that are made by the manufacturer himself and bought in the parts market respectively. Only about 8 per cent of the car models are fitted with carbureters of the car manufacturer's own make. On the other hand, as many as 58 per cent of the models carry engines of the manufacturer's own make. The engine is naturally the most characteristic feature of a car and any concern that wants to manufacture some of the large components seems to begin with the engine, notwithstanding that this is the most complicated part, that it requires the most elaborate tool equipment to manufacture economically, and that the production methods employed in its manufacture are the most highly developed of any found in the automotive parts industry. Gearsets come next after the engine, with 41.3 per cent of "own" manufacture, followed by rear axles, with 34.9 per cent. Exactly one-third of all clutches are made by the car manufacturers, and one-fourth of all steering gears.

French Automobile Exports from 1906 to 1913

Value of Exports in Dollars

	1906	1907	1908	1909	1910	1911	1912	1913
Great Britain	12,114,138	12,081,904	12,211,232	12,568,800	12,847,380	9,887,580	11,010,780	10,955,200
Germany	3,228,350	2,720,482	2,091,244	1,980,400	2,497,020	2,632,320	3,228,300	4,123,400
Belgium	2,897,136	3,115,766	2,309,414	4,368,800	5,696,820	6,601,260	10,042,000	8,182,800
United States	2,409,316	2,174,420	2,200,582	1,610,600	852,300	671,160	972,660	636,600
Argentine	1,467,380	1,120,176	867,680	1,225,600	1,821,360	1,692,540	2,755,260	3,444,200
Italy	1,170,844	793,584	436,058	577,000	998,440	857,700	632,280	1,166,600
Switzerland	470,500	760,412	385,956	587,400	875,680	1,028,880	922,800	954,200
Spain	547,720	754,292	568,538	667,200	461,880	3,234,600	938,160	1,364,800
Egypt	578,966	665,994	189,326	165,400	231,840	.....	.....	290,800
Mexico	238,656	591,210	456,332	526,000	383,700	421,920	518,520	441,800
Brazil	325,094	893,452	427,438	378,800	433,380	1,421,700	2,342,040	1,740,600
Russia	301,690	299,188	665,452	881,800	986,760	494,280	404,640	1,309,800
Holland	125,812	184,670	216,788	278,800	225,720	247,860	347,580	378,800
Portugal	90,610	201,632	79,620	.....	.....	.....	689,580	602,000
Austria	110,904	183,062	67,020	161.400	192,240	421,380	193,860	245,800
British India	73,468	.....	.....	.....	.....	.....	.....	197,600
Denmark	.....	196,210	121,310	170,200	205,740	234,000	222,480	581,200
Chili	133,694	215,864	.....	.....	.....	.....	385,200	511,800
Turkey	.....	.....	170,436	.....	.....	297,540	.....	.....
Uruguay	.....	.....	.....	.....	.....	.....	251,280	265,200
Roumania	.....	.....	.....	.....	.....	62,400	.....	.....
Columbia	.....	.....	.....	.....	.....	38,880	24,240	.....
Australia	.....	.....	.....	.....	224,100	258,300	188,280	246,200
Canada	.....	.....	.....	.....	246,780	257,400	37,680	.....
Dutch Indies	.....	.....	.....	.....	152,640	174,420	468,540	470,800
Other Countries	482,264	598,486	401,568	867,800	826,920	910,060	1,071,480	1,281,200
French Colonies	804,346	1,319,518	1,633,552	2,306,800	2,192,820	3,219,120	4,751,640	6,098,000
Total	27,570,888	28,870,322	25,459,746	29,322,800	32,375,120	32,477,820	42,399,480	45,489,400

French manufacturers ceased to export automobiles in 1913, so that these 1913 figures are the last available. With the ending of the war it is believed that French manufacturers will be unable to meet the home demand. Consequently, these pre-war export figures indicate potential markets for high priced cars, such as has been the usual French type. This means that there is forty-five and a half million dollars worth of business awaiting American manufacturers who can meet the need formerly cared for by the French. The figures show that the exports increased from 1906 to 1913, so that it is reasonable to suppose that the potential demand is now in excess of $45,489,400. England was formerly the largest single buyer of French automobiles, and the English manufacturers are having as many production troubles as the French, so that the market there for a car which will take the place of the French cars should be excellent. The Belgian market also presents large possibilities.

1920 Passenger Automobiles Listed

MAKE AND MODEL	Wheelbase	Number of Cylinders	Bore and Stroke	Piston Displacement	Make of Engine	Cylinder Shape	Cam-shaft Drive	Water Circulation	LUBRICATION		CARBURETION		IGNITION			ELECTRIC SYSTEM		CLUTCH	
									System	Type of Pump	Make of Carburetor	Fuel Feed	System	Make	Control	Generator Make	Voltage	Make	Type
Allen.....43	110	4	3½x5	192.4	Own.....	L...	Helical	Ther...	Circ-Spl..	Gear.....	Stromberg.	Vacuum...	Single...	Bosch.....	Hand..	Auto-Lite....	7	Borg & Beck.	Plate..
American Beauty.....	121	6	3¼x4½	224.0	Continental.	L...	Spur...	Pump..	Splash-Pr.	Gear.....	Rayfield...	Vacuum...	Single...	.....	Hand..	Westinghouse	6	Borg & Beck.	Plate..
Anderson.....30	120	6	3¼x4½	224.0	Continental.	L...	Spur...	Pump..	Splash-Pr.	.....	Rayfield...	Vacuum...	Single...	Remy.....	Hand..	Remy.....	6	Borg & Beck.	Plate..
Apperson ...Anniversary	130	8	3½x5	331.8	Own.....	L...	Helical	Ther...	Pressure..	Gear.....	Johnson...	Vacuum...	Single...	.....	Hand..	Bijur.....	6	Own.....	Disk..
Apperson.....8-20	130	8	3½x5	331.8	Own.....	L...	Helical	Ther...	Pressure..	Gear.....	Johnson...	Vacuum...	Single...	.....	Hand..	Bijur.....	6	Own.....	Disk..
Auburn.....6-39	120	6	3¼x4½	224.0	Continental.	L...	Helical	Pump..	Splash-Pr.	Eccentric.	Rayfield...	Vacuum...	Single...	Remy.....	Hand..	Remy.....	6	Borg & Beck.	Plate..
Biddle.....B-1	121	4	3½x5⅛	.....	Buda.....	L...	Helical	Ther...	Circ-Spl..	Gear.....	Zenith....	Vacuum...	Single...	Simms....	Hand..	G. & D.....	6	Warner.....	Disk..
Bour-Davis.....20	118	6	3¼x4½	224.0	Continental.	L...	Helical	Pump..	Circ-Spl..	Piston....	Stromberg.	Vacuum...	Single...	Remy.....	Hand..	Remy.....	6	Borg & Beck.	Plate..
Brewster.....	125	4	4 x5½	276.5	Own.....	K...	Chain..	Pump..	Pressure..	Gear.....	Stromberg.	Vacuum...	Single...	Berling....	Hand..	U.S.L.....	12	Own.....	Cone..
Briscoe.....4-34	109	4	3½x5	178.9	Own.....	L...	Helical	Ther...	Splash-Pr.	Piston....	Own.....	Gravity...	Single...	Conn.....	Hand..	Auto-Lite....	6	Own.....	Cone..
Buick.....45	118	6	2⅞x4½	241.6	Own.....	I...	Helical	Pump..	Circ-Spl..	Gear.....	Marvel....	Vacuum...	Single...	Delco.....	H. & A	Delco.....	6	Own.....	Disk..
Buick.....49	124	6	3⅛x4½	241.6	Own.....	I...	Helical	Pump..	Circ-Spl..	Gear.....	Marvel....	Vacuum...	Single...	Delco.....	H. & A	Delco.....	6	Own.....	Disk..
Cadillac.....57	125	8	3½x5⅛	314.4	Own.....	L...	Chain..	Pump..	Pressure..	Gear.....	Own.....	Pressure...	Single...	Delco.....	H. & A.	Delco.....	6	Own.....	Disk..
Case.....V	126	6	3½x5¼	303.1	Continental.	L...	Helical	Pump..	Splash-Pr.	Piston....	Rayfield...	Vacuum...	Single...	Delco.....	H. & A.	Westinghouse	....	Borg & Beck.	Plate..
Chalmers.....	117	6	3¼x4½	224.0	Own.....	L...	Chain..	Ther...	Splash-Pr.	Gear.....	.....	Vacuum...	Single...	.....	Hand..	.....	6	Own.....	Disk..
Chalmers.....	122	6	3¼x4½	224.0	Own.....	L...	Chain..	Ther...	Splash-Pr.	Gear.....	.....	Vacuum...	Single...	.....	Hand..	.....	6	Own.....	Disk..
Champion.....	116	4	3½x5	192.4	Lycoming...	L...	Helical	Ther...	Non-Circ.	None....	Zenith....	Vacuum...	Single...	Delco.....	Hand..	Delco.....	6	Borg & Beck.	Plate.
Champion.....	118	4	3½x5	192.4	Hersh-Sp...	L...	Helical	Ther...	Non-Circ.	None....	Carter....	Vacuum...	Single...	At Kent...	Hand..	Dyneto.....	6	Borg & Beck.	Plate.
Chandler.....	123	6	3½x5	233.6	Own.....	L...	Chain..	Pump..	Circ-Spl..	Piston....	Rayfield...	Vacuum...	Single...	Bosch.....	Hand..	G. & D.....	6	Borg & Beck.	Plate..
Chevrolet.....490	102	4	3½x4	170.9	Own.....	I...	Helical	Pump..	Circ-Spl..	Gear.....	Zenith....	Gravity...	Single...	Simms....	Hand..	Auto-Lite....	6	Own.....	Cone..
Chevrolet.....F.B.	110	4	3½x5⅛	226.4	Own.....	I...	Helical	Pump..	Circ-Spl..	Gear.....	Zenith....	Vacuum...	Single...	Simms....	Hand..	Auto-Lite....	6	Own.....	Cone..
Cleveland.....40	112	6	3 x4½	190.8	Own.....	I...	Chain..	Pump..	Splash-Pr.	Gear.....	Stromberg.	Vacuum...	Single...	G. & D....	Hand..	G. & D.....	6	Borg & Beck.	Plate..
Cole.....870	127	8	3½x4½	346.3	Northway..	L...	Helical	Pump..	Splash-Pr.	Gear.....	Johnson...	Vacuum...	Single...	Delco.....	Hand..	Delco.....	6	Northway...	Cone..
Columbia.....	115	6	3¼x4½	224.0	Continental.	L...	Helical	Pump..	Splash-Pr.	Piston....	Stromberg.	Vacuum...	Single...	At Kent...	Hand..	Auto-Lite....	6	Borg & Beck.	Plate..
Comet.....	125	6	3½x5¼	303.1	Continental.	L...	Helical	Pump..	Circ-Spl..	Piston....	Stromberg.	Vacuum...	Single...	.....	Hand..	Wagner.....	6	Borg & Beck.	Plate..
Commonwealth.....	117	4	3½x5	192.4	Lycoming...	L...	Helical	Ther...	Splash-Pr.	Eccentric.	Carter....	Vacuum...	Single...	At Kent...	Hand..	Dyneto.....	6	Borg & Beck.	Plate..
Crow-Elkhart L-53-4-5-6	117	4	3½x5	192.4	Lycoming...	L...	Helical	Ther...	Circ-Spl..	Piston....	Zenith....	Vacuum...	Single...	Conn.....	Hand..	Dyneto.....	6	Borg & Beck.	Plate..
Crow-Elkhart H-53-4-5-6	117	6	3½x5	230.1	Rutenber...	L...	Helical	Pump..	Circ-Spl..	Piston....	Zenith....	Vacuum...	Single...	Conn.....	Hand..	Dyneto.....	6	Borg & Beck.	Plate..
Cunningham.....V-3	132 142	8	3¼x5	441.7	Own.....	L...	Helical	Pump..	Pressure..	Gear.....	Stromberg.	Vacuum...	Single...	Delco.....	Hand..	Westinghouse	6	Brown-Lipe..	Disk..
Daniels.....D-19	132	8	3½x5¼	404.1	Own.....	L...	Helical	Pump..	Pressure..	Gear.....	Zenith....	Pressure...	Single...	Delco.....	Hand..	Delco.....	6	.....	Disk..
Davis.....51	120	6	3¼x4½	224.0	Own.....	L...	Helical	Pump..	Pressure..	Gear.....	Stromberg.	Vacuum...	Single...	Delco.....	Hand..	Delco.....	6	Borg & Beck.	Plate..
Dixie.....H-S 53	112	4	3¼x5	165.9	Hersh-Sp...	L...	Helical	Ther...	Splash-Pr.	Gear.....	Stromberg.	Vacuum...	Single...	.....	Hand..	Dyneto.....	6	Borg & Beck.	Plate..
Dodge Brothers.....	114	4	3⅞x4½	212.3	Own.....	L...	Helical	Pump..	Circ-Spl..	Eccentric.	Stewart...	Vacuum...	Single...	.....	H. & A.	Northeast...	12	Own.....	Disk..
Dorris.....6-80	132	6	4 x5	377.0	Own.....	I...	Helical	Pump..	Pressure..	Gear.....	Stromberg.	Vacuum...	Single...	Bosch.....	Hand..	Westinghouse	6	Warner.....	Disk..
Dort.....15	105½	4	3½x5	192.4	Lycoming...	L...	Helical	Ther...	Circ-Spl..	Piston....	Carter....	Vacuum...	Single...	Conn.....	Hand..	Westinghouse	6	Own.....	Cone..
Economy.....6-46	115	6	3¼x4½	224.0	Continental.	L...	Helical	Pump..	Splash-Pr.	Piston....	Zenith....	Vacuum...	Single...	Conn.....	Hand..	Auto-Lite....	6	Borg & Beck.	Plate..
Elcar.....	116	6	3¼x4½	224.0	Continental.	L...	Helical	Pump..	Pressure..	Gear.....	Stromberg.	Vacuum...	Single...	.....	Hand..	Delco.....	6	Borg & Beck.	Plate..
Elcar.....	116	4	3½x5	192.4	Lycoming...	L...	Helical	Ther...	Circ-Spl..	Eccentric.	Stromberg.	Vacuum...	Single...	.....	Hand..	Delco.....	6	Borg & Beck.	Plate..
Elgin.....	118	6	3½x4½	.....	Falls.....	I...	Helical	Ther...	Splash-Pr.	Piston....	Stromberg.	Vacuum...	Single...	Wagner...	Hand..	Wagner.....	6	Borg & Beck.	Plate..
Essex.....A	103½	4	3⅜x5	178.9	Own.....	F...	Helical	Ther...	Circ-Spl..	Piston....	Own.....	Vacuum...	Single...	Delco.....	Hand..	Delco.....	6	Own.....	Disk..
Ford.....T	100	4	3¾x4	176.7	Own.....	L...	Spur...	Ther...	Circ-Spl..	.....	Holley....	Gravity...	Dual....	Own.....	Hand..	Own.....	6	Own.....	Fric...
Franklin.....9	115	6	3¼x4	199.1	Own.....	I...	Helical	Air....	Pressure..	Gear.....	Own.....	Vacuum...	Single...	At Kent...	Atmtc..	Dyneto.....	12	Borg & Beck.	Plate..
Grant.....H	116	6	3⅛x4½	198.9	Own.....	I...	Helical	Ther...	Circ-Spl..	Gear.....	Stromberg.	Vacuum...	Single...	At Kent...	Hand..	Bijur.....	6	Borg & Beck.	Plate.
Hackett.....	114	4	3½x5	192.4	Hersh-Sp...	L..	Helical	Ther...	Splash-Pr.	.....	Johnson...	Vacuum...	Single...	U.S.L.....	Hand..	Westinghouse	6	Borg & Beck.	Plate.
Harroun.....A-A-2	106	4	3¼x5¼	174.2	Own.....	I...	Spur...	Ther...	Splash-Pr.	Piston....	Stromberg.	Vacuum...	Single...	Remy.....	Hand..	Remy.....	6	Own.....	Cone..
Haynes.....45	.....	6	3½x5	288.6	Own.....	L..	Helical	Pump..	Circ-Spl..	Piston....	Rayfield...	Vacuum...	Single...	Kingston..	Hand..	Leece-N.....	6	Borg & Beck.	Plate..

ABBREVIATIONS

2-pt—Two Point
¾ Ell—¾ Elliptic
¾ Float—¾ Floating
Amid—Amidships
Atmtc—Automatic
B & P—Ball and Plain
B & R—Ball and Roller
B R & P—Ball, Roller and Plain
Cant—Cantilever
Circ-Spl—Circulating Splash
Dual-D—Dual Double
Ell—Elliptic
F—1 Valve in Head, 1 in Side
Float—Floating
Fric—Friction
Gear—Gear Pump
H & A—Hand and Automatic
I—I-Head
K—Knight Type
L—L-Head
Mag—Magnetic
Non-Cir—Non-Circulating Splash
Opt—Optional
Plat—Platform

E GUIDE AND GRIPPER

with Their Technical Specifications

TRANSMISSION							Gear Ratio on Direct	RUNNING GEAR				Make of Steering Gear	Make of Speed-ometer	Crank-shaft Bear-ings and No.	BEARINGS			MAKE AND MODEL
GEARSET			Final Drive	Torque Taken By	Make of Rear Axle	Rear Axle Type		TIRES		Wheels	Rear Springs				Gear Set	Rear Axle	Front Wheel	
Make	Loca-tion	Speeds						Front	Rear									
Own	Unit	E. 3	Sp.B	Springs	Columbia	¾ Float	4.63	32x4	32x4	Opt	S-E	Ditweiler	Stewart	Plain 3	Roller	Roller	Roller	Allen 43
Detroit	Unit	E. 3	Bevel	Springs	Timken	Semi-F	4.90	33x4	33x4	Opt	S-E	Standard		Plain 3	Ball	Roller	Roller	American Beauty
Durston	Unit	E. 3	Sp.B	Springs	Salisbury	Float	4.50	33x4	33x4	Wood	S-E	Jacox	Stewart	Plain 4				Anderson 30
Own	Amid	3	Sp.B	Springs	Own	¾ Float	4.25	33x4	33x4	Wire	¾-Ell	Own	VanSicklen	Plain 3	Roller	Roller	Roller	Apperson Anniversary
Own	Amid	3	Sp.B	Springs	Own	¾ Float	4.25	34x4½	34x4½	Wood	¾-Ell	Own	VanSicklen	Plain 3	Roller	Roller	Roller	Apperson 8-20
Grant-Lees	Unit	E. 3	Sp.B	Springs	Columbia	Float	4.66	33x4	33x4	Wood	S-E	Jacox	Stewart	Plain 3	Ball	Roller	Roller	Auburn 6-39
Warner	Unit	E. 4	Sp.B	Springs	Stanpar	Semi-F	4.50	32x4	32x4	Opt	S-E	Gemmer	Stewart	Plain 3	Ball	Roller	Roller	Biddle B-1
Detroit	Unit	E. 3	Sp.B	Springs	Salisbury	¾ Float	4.75	32x4	32x4	Wood	S-E	C.A.S.	Stewart	Plain 3	Ball	B.&R.	Roller	Bour-Davis 20
Own	Unit	T. 3	Sp.B	Springs	Own	Float	4.50	34x4½	34x4½	Wood	Cant	Own	Stewart	Plain 3	Ball	Ball	Roller	Brewster
Own	Unit	E. 3	Sp.B	Tor-A	Own	¾ Float	4.18	31x4	31x4	Opt	S-E	Own	Stewart	Plain 3	B.&P	B.&R.	Ball	Briscoe 4-34
Own	Unit	E. 3	Bevel	Sprin s	Own	Float	4.00	33x4	33x4	Wood	Cant	Own	Allis-Chal's.	Plain 4	Ball	B. & R.	Roller	Buick 45
Own	Unit	E. 3	Bevel	Sprin s	Own	Float	4.00	34x4½	34x4½	Wood	Cant	Own	Allis-Chal's.	Plain 4	Ball	B. & R.	Roller	Buick 49
Own	Unit	E. 3	Sp.B	Springs	Timken	Float	4.44	35x5	35x5	Wood	Plat	Own	VanSicklen	Plain 3	B.&R.	Roller	Roller	Cadillac 57
Grant-Lees	Unit	E. 3	Sp.B	Springs		Float	4.45	34x4½	34x4½	Wood	S-E	Jacox	VanSicklen	Plain 3	Ball	Roller	Roller	Case V
Own	Unit	E. 3	Sp.B	Springs		Semi-F	4.75	32x4	32x4	Wood	S-E	Own		Plain	B.&R.	Roller	Roller	Chalmers
Own	Unit	E. 3	Sp.B	Springs		Semi-F	5.18	33x4½	33x4½	Wood	S-E	Own		Plain	B.&R.	Roller	Roller	Chalmers
Grant-Lees	Unit	E. 3		Springs	Peru	Float	4.25	32x3½	32x3½	Wood	S-E	C.A.S.	Stewart	Plain 2	Ball	Roller	Roller	Champion
Grant-Lees	Unit	E. 3		Springs	Peru	Float	4.25	32x4	32x4	Wood	S-E	C.A.S.	VanSicklen	Plain 2	Ball	Roller	Roller	Champion
Own	Unit	E. 3	Sp.B	Springs	Own	¾ Float	4.40	33x4	33x4	Wood	S-E	Opt	Stewart	Plain 3	Ball	Ball	Roller	Chandler
Own	U it	E. 3	Sp.B	Springs	Own	¾ Float	3.63	31x4	31x4	Wood	S-E	Own	Stewart	Plain 3	Ball	Roller	Ball	Chevrolet 490
Own	Unit	E. 3	Sp.B	Springs	Own	Semi-F	4.62	33x4	33x4	Wood	¼-Ell	Warner	Stewart	Plain 3	Ball	Roller	Ball	Chevrolet F.B.
Mechanics	Unit	E. 3	Sp.B	Springs	Own	Semi-F	4.45	32x4	32x4	Wood	S-E	Ditweiler	VanSicklen	Plain 3	Ball	Roller	Roller	Cleveland 40
Northway	Unit	E. 3	Sp.B	Springs	Columbia	Float	4.45	33x5	33x5	Wood	S-E	Gemmer	Stewart	Plain 3	B.&R.	Roller	Roller	Cole 870
Durston	Unit	E. 3	Sp.B	Springs	Timken	Semi-F	4.75	32x4	32x4	Opt	Cant	Gemmer	Stewart	Plain 3	B.&P	Roller	Roller	Columbia
Muncie	Unit	E. 3	Sp.B	Tor-A	Columbia	¾ Float	4.66	33x4	33x4	Opt	Cant	Gemmer	Stewart	Plain 3	Roller	Roller	Roller	Comet
Grant-Lees	Unit	E. 3	Sp.B	Springs	Peru	Float	4.25	32x4	32x4	Wood	S-E	C.A.S.	VanSicklen	Plain 2	Ball	Ball	Roller	Commonwealth
Covert	Unit	E. 3	Sp.B	Springs	Peru	Float	4.25	32x3½	32x3½	Opt	Ell	Ditweiler	Stewart	Plain 1	Roller	Roller	Roller	Crow-Elkhart L-53-4-5-6
Covert	Unit	E. 3	Sp.B	Springs	Peru	Float	4.25	33x4	33x4	Opt	Ell	Ditweiler	Stewart	Plain 1	Ball	Roller	Roller	Crow-Elkhart H-53-4-5-6-7
Brown-Lipe	Unit	E. 3	Sp.B	Springs	Timken	Float	4.08	35x5	35x5	Opt	¾ Ell	Gemmer	Stewart	Plain 3	B.&R.	Roller	Roller	Cunningham V-3
Own	Unit	E. 3	Sp.B	Tor-A	Timken	Float	4.40	34x4½	34x4½	Opt	S-E	Gemmer	Stewart	Plain 3	Ball	Roller	Roller	Daniels D-19
T.W.Warner	Unit	E. 3	Sp.B	Springs	Salisbury	Float	4.75	33x4	33x4	Wood	S-E	T.W.Warner	Stewart	Plain 4	Ball	B.&R.	Roller	Davis 51
Grant-Lees	Unit	E. 3	Sp.B	Tor-T	Peru	Float	4.72	32x4	32x4	Opt	¾-Ell	C.A.S.	VanSicklen	Plain 2	Ball	Roller	Roller	Dixie H-S 50
Own	Unit	E. 3	Sp.B	Springs	Own	Float	4.16	32x3½	32x3½	Wood	¾ Ell	Own	Johns-Man	Plain 3	Ball	Roller	Roller	Dodge Brothers
Warner	Unit	E. 3	Sp.B	Springs	Timken	Float	3.50	33x5	33x5	Wood	S-E	Ross	VanSicklen	Plain 7	B.&R.	Roller		Dorris 680
Mechanics	Unit	E. 3	Bevel	Springs	Flint	¾ Float	4.07	30x3½	30x3½	Opt	Cant	Jacox	Stewart	Plain 2	B.&P	Roller	Roller	Dort 15
Durston	Unit	E. 3	Sp.B	Springs	Salisbury	¾ Float	4.50	33x4	33x4	Opt	S-E	Ditweiler	Stewart	Plain 3	Ball	Ball	Roller	Economy 6-46
Muncie	Unit	E. 4	Sp.B	Springs	Salisbury	¾ Float	4.50	33x4	33x4	Wood	S-E	C.A.S.	Stewart	Plain 4	Ball	Ball	Roller	Elcar
Muncie	Unit	E. 4	Sp.B	Springs	Salisbury	¾ Float	4.50	33x4	33x4	Wood	S-E	C.A.S.	Stewart	Plain 2	Ball	Ball	Roller	Elcar
Mechanics	Unit	E. 3	Sp.B	Springs	Columbia	¾ Float	5.09	33x4	33x4	Wood	Cant	C.A.S.	Van Sicklen	Plain 3	Ball	Roller	Roller	Elgin
Own	Unit	E. 3	Sp.B	Springs	Timken	Semi-F	5.09	32x4	32x4	Opt	S-E	Gemmer	Stewart	Plain 3	Roller	Roller	Roller	Essex A
Own	Unit	E. 2	Bevel	R-R.,T-A.	Own	Semi-F	3.63	30x3	30x3½	Wood	S-E	Own		Plain 3	Plain	Roller	B.&R.	Ford T
Own	Amid	3	Sp.B	Springs	Own	Semi-F	4.33	32x4	32x4	Wood	Ell	Own	Stewart	Plain 7	Ball	Ball	Ball	Franklin 9
Durston	Unit	E. 3	Sp.B	Springs	Columbia	¾ Float	4.63	32x4	32x4	Wood	S-E	Jacox	VanSicklen	Plain 3	B.&P	Roller	Roller	Grant H
Grant-Lees	Unit	E. 3	Sp.B	Springs	Stanpar	Semi-F	4.75	32x4	32x4	Wood	¾-Ell	Gemmer	Stewart	Plain 2	Ball	Roller	Roller	Hackett
Grant-Lees	Unit	E. 3	Bevel	Springs	Adams	¾ Float	4.00	30x3½	30x3½	Wood	Cant	Lavine		Plain 3	Ball	B.&R.	Roller	Harroun A-A-2
Own	Unit	E. 3	Sp.B	Springs	Own	¾ Float	4.42	34x4½	34x4½	Wood	S-E	Jacox	Stewart	Plain 3	Ball	Ball	Ball	Haynes 45

Rad-Rd—Radius Rods
S-E—Semi-Elliptic
Semi-F—Semi-Floating
Sp.B—Spiral Bevel
Splash-Pr—Splash Pressure
Spur—Spur Gears
T—T-Head
Ther—Thermo-Syphon
Tor-A—Torsion Arm
Tor-T—Torsion Tube
Trans—Transverse
Unit-E—Unit with Engine
Unit-T—Unit with Torque Tube
Unit-A—Unit with Axle

EQUIPMENT

At Kent—Atwater Kent
G. & D.—Gray & Davis
Hersh-Sp—Herschell-Spillman
Johns-Man—Johns-Manville
Leece-N—Leece-Neville
Teet-Hart—Teetor-Hartley
Ward-L—Ward Leonard
West-M—Weston-Mott

E GUIDE AND GRIPPER

1920 Passenger Automobiles Listed with

MAKE AND MODEL	Wheelbase	Number of Cylinders	Bore and Stroke	Piston Displacement	Make of Engine	Cylinder Shape	Cam-shaft Drive	Water Circu-lation	LUBRICATION		CARBURETION		IGNITION			ELECTRIC SYSTEM		CLUTCH	
									System	Type of Pump	Make of Carbu-reter	Fuel Feed	Sys-tem	Make	Con-trol	Generator Make	Voltage	Make	Type
Haynes.....46	.....	12	2¾x5	356.4	Own.....	I...	Chain..	Pump..	Pressure..	Gear.....	Rayfield...	Vacuum...	Single...	Delco.....	Hand..	Leece-N.....	6	Borg & Beck	Plate..
Hollier.....206-B	120	6	3¼x4½	224.0	Continental	L...	Helical.	Pump..	Splash-Pr.	Piston...	Zenith....	Vacuum...	Single...	Remy.....	Hand..	Westinghouse	6	Fuller.....	Disk..
Holmes.....	126	6	3½x4¼	245.3	Own.....	I...	Helical.	Air....	Pressure..	Gear.....	Newcomb..	Vacuum...	Dual....	Eisemann..	Atmtc..	Dyneto.....	12	Brown-Lipe..	Disk..
Hudson.....O	125½	6	3½x5	288.6	Own.....	L...	Helical.	Pump..	Circ-Spl..	Piston...	Own.....	Vacuum...	Single...	Delco.....	Atmtc.	Delco.....	6	Own.....	Disk..
Hupmobile.....R-3	112	4	3¼x5½	182.5	Own.....	L...	Chain..	Ther...	Splash-Pr.	Gear.....	Stromberg.	Vacuum...	Single...	At Kent...	Hand..	Westinghouse	6	Own.....	Disk..
Jones.....28	126	6	3½x5¼	303.1	Continental.	L...	Helical.	Pump.	Circ-Spl..	Eccentric.	Rayfield...	Vacuum...	Single...	Auto-Lite..	Hand..	Auto-Lite....	6	Borg & Beck	Plate..
Jordan.....M	120	6	3¼x4½	224.0	Continental.	L...	Helical.	Pump..	Splash-Pr.	Gear.....	Stromberg.	Vacuum...	Single...	Delco.....	Hand..	Delco.....	6	Detroit.....	Plate..
Jordan.....F	127	6	3½x5¼	303.1	Continental.	L...	Helical.	Pump..	Splash-Pr.	Piston...	Stromberg.	Vacuum...	Single...	Delco.....	Hand..	Delco.....	6	Detroit.....	Plate..
King.....H	120	8	3 x5	282.7	Own.....	L...	Chain..	Ther...	Pressure..	Gear.....	Ball.....	Vacuum...	Single...	.....	Hand..	Westinghouse	6	Detroit.....	Plate..
Kissel.....45	124	6	3 5/16x5½	284.4	Own.....	F...	Spur...	Pump..	Splash-Pr.	Gear.....	Stromberg.	Vacuum...	Single...	Bosch.....	Hand..	Remy.....	....	Warner.....	Disk..
Kline.....6-55-J	121	6	3¼x4½	224.0	Continental.	L...	Spur...	Pump .	Pressure..	Gear.....	Rayfield...	Vacuum...	Single...	.....	Hand..	Wagner.....	6	Borg & Beck	Plate..
Lexington.....S	120	6	3¼x4½	224.0	Continental.	L...	Helical.	Pump..	Pressure..	Gear.....	Rayfield...	Vacuum...	Single...	Conn.....	Hand..	G. & D.....	6	Borg & Beck	Plate..
Liberty.....10-C	117	6	3½x5	230.1	Own.....	L...	Helical.	Ther...	Pressure..	Gear.....	Stromberg.	Vacuum...	Single...	Wagner...	Hand..	Wagner.....	6	Borg & Beck	Plate..
Locomobile.....48	142	6	4½x5½	524.8	Own.....	T...	Helical.	Pump..	Splash-Pr.	Gear.....	Own.....	Pressure...	Double..	Berling....	Hand..	Westinghouse	6	Own.....	Disk..
Maibohm.....B	116	6	3½x4¼	195.6	Falls.....	I...	Helical.	Ther...	Splash-Pr.	Piston...	Stromberg.	Vacuum...	Single...	At Kent...	Hand..	Bijur.....	6	Borg & Beck	Plate..
Marmon.....34	136	6	3¾x5⅛	339.7	Own.....	I...	Helical.	Pump..	Pressure..	Gear.....	Stromberg.	Gravity...	Single...	Delco.....	Hand..	Delco.....	6	Own.....	Plate..
Maxwell.....25	109	4	3 5/16x4½	185.8	Own.....	L...	Helical.	Ther...	Splash-Pr.	Piston...	.....	Vacuum...	Single...	.....	Hand..	.....	12	Own.....	Cone..
McFarlan.....127	136	6	4½x6	572.5	Teet.-Hart..	T...	Helical.	Pump..	Splash-Pr.	Piston...	Stromberg.	Vacuum...	Double..	Bosch.....	Hand..	Westinghouse	6	Borg & Beck	Plate..
Mercer.....5	115 132	4	3¾x6¾	298.2	Own.....	L...	Chain..	Pump..	Splash-Pr.	Gear.....	Ball.....	Vacuum...	Single...	Berling....	Hand..	Westinghouse	6	Own.....	Disk..
Meteor.....	129	4	4 x6	301.6	Duesenberg.	F...	Chain..	Pump..	Splash-Pr.	Gear.....	Zenith....	Vacuum...	Single...	Simms....	Hand..	Bijur.....	6	Borg & Beck	Plate..
Metz.....	120	6	3½x5	230.1	Rutenber...	T...	Helical.	Pump..	Splash-Pr.	Gear.....	Stromberg.	Vacuum...	Single...	Conn.....	Hand..	Westinghouse	6	Borg & Beck	Plate..
Mitchell.....F-40	120	6	3¼x5	248.9	Own.....	L...	Helical.	Pump..	Splash-Pr.	Piston...	Rayfield...	Vacuum...	Single...	Remy.....	Hand..	Remy.....	6	Borg & Beck.	Plate..
Moline-Knight.....R	.....	4	3¾x5	220.9	Own.....	K...	Chain..	Ther...	Splash-Pr.	Gear.....	Schebler...	Vacuum...	Single...	.....	Hand..	Wagner.....	6	Borg & Beck.	Plate..
Moline-Knight.....J	.....	6	3½x4½	259.8	Own.....	K...	Chain..	Ther...	Splash-Pr.	Gear.....	Schebler...	Vacuum...	Single...	.....	Hand..	Wagner.....	6	Borg & Beck.	Plate..
Monroe.....	115	4	3¼x4½	149.3	Own.....	F...	Helical.	Ther...	Pressure..	Gear.....	Zenith....	Vacuum...	Single...	U.S.L.....	Hand..	Auto-Lite....	6	Own.....	Disk..
Moon..... Victory	122	6	3¼x4½	224.0	Continental	L...	Helical.	Pump..	Splash-Pr.	Piston...	Rayfield...	Vacuum...	Single...	.....	Atmtc..	Delco.....	6	Borg & Beck.	Plate..
Moon.....6-68	125	6	3½x5¼	303.1	Continental	L...	Helical.	Pump..	Splash-Pr.	Piston...	Rayfield...	Vacuum...	Single...	.....	Atmtc..	Delco.....	6	Borg & Beck.	Plate..
Nash 681-2-4-5-6-7	121	6	3¼x5¼	261.3	Own.....	I...	Helical.	Pump..	Circ-Spl..	Gear.....	Marvel....	Vacuum...	Single...	.....	Atmtc..	Wagner.....	6	Borg & Beck.	Plate..
National .....Sextet	130	6	3½x5¼	303.1	Own.....	I...	Chain..	Pump..	Pressure..	Gear.....	Rayfield...	Vacuum...	Single...	Delco.....	H. & A.	Westinghouse	6	Borg & Beck.	Plate..
Nelson.....D	104	4	3 1/16x4¾	145.7	Own.....	I...	Helical	Ther...	Pressure..	Gear.....	Zenith....	Vacuum...	.....	Bosch.....	Hand..	U.S.L.....	12	Own.....	Disk..
Noma.....1-B	128	6	3¼x4½	224.0	Continental.	L...	Helical.	Pump..	Pressure..	Gear.....	Zenith....	Vacuum...	Single...	Delco.....	Hand..	Delco.....	6	Borg & Beck.	Plate..
Oakland.....34-C	115	6	2 13/16x4¾	177.0	Own.....	I...	Helical.	Pump..	Pressure..	Gear.....	Marvel....	Vacuum...	Single...	Bosch.....	Hand..	Remy.....	6	Own.....	Cone..
Oldsmobile.....37-A	112	6	2 13/16x4¾	177.0	Own.....	I...	Helical.	Pump..	Pressure..	Gear.....	Johnson...	Vacuum...	Single...	.....	Hand..	Remy.....	6	Own.....	Cone..
Oldsmobile.....45-B	122	8	2 7/16x4¾	246.7	Own.....	T..	Helical.	Pump..	Pressure..	Gear.....	Ball.....	Vacuum...	Single...	.....	Hand..	Delco.....	6	Own.....	Cone..
Overland.....4	100	4	3 5/16x4	143.1	Own.....	L..	Helical.	Ther...	Splash-Pr.	Flywheel.	Tillotson.	Gravity...	Single...	Conn.....	Hand..	Auto-Lite....	6	Borg & Beck.	Disk..
Packard.....335	136	12	3 x5	424.1	Own.....	L...	Chain..	Pump..	Pressure..	Gear.....	Own.....	Pressure...	Single...	Delco.....	H. & A.	Bijur.....	6	Own.....	Disk..
Packard.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Paige.....6-42	119	6	3¼x5	230.1	Own.....	L...	Helical.	Pump..	Splash-Pr.	Piston...	Stromberg.	Vacuum...	Single...	At Kent...	H. & A.	G. & D.....	6	Borg & Beck.	Plate..
Paige.....6-55	127	6	3½x5¼	303.1	Continental.	L...	Helical.	Pump..	Splash-Pr.	Piston...	Rayfield...	Vacuum...	Single...	At Kent...	H. & A.	G. & D.....	6	Borg & Beck.	Plate..
Paterson.....6-47	120	6	3¼x4½	224.0	Continen tal	L...	Helical.	Pump..	Splash-Pr.	Piston...	Stromberg.	Vacuum...	Single...	.....	Hand..	Delco.....	6	Borg & Beck.	Plate..
Peerless.....56	125	8	3¼x5	331.8	Own.....	L...	Helical.	Pump..	Pressure.	Gear.....	Ball.....	Vacuum...	Single...	Auto-Lite..	H. & A.	Auto-Lite....	6	Brown-Lipe..	Disk..
Piedmont.....6-40	122	6	3¼x4½	224.0	Continental.	L...	Helical.	Pump..	Non-Circ.	Piston...	Stromberg.	Vacuum...	Single...	Remy.....	Hand..	Remy.....	6	Borg & Beck.	Plate..
Piedmont.....	116	4	3½x5	.....	Lycoming...	L...	Helical.	Pump..	Circ-Spl..	Piston...	Carter....	Vacuum...	Single...	Delco.....	Hand..	Dyneto.....	6	Borg & Beck.	Plate..
Pierce-Arrow.....31	134	6	4 x5½	192.4	Own.....	T...	Helical.	Pump..	Pressure..	Gear.....	Own.....	Pressure...	Dual-D..	Delco.....	H. & A.	Westinghouse	6	Own.....	Cone..

ABBREVIATIONS

2-pt—Two Point
¾ Ell—¾ Elliptic
¾ Float—¾ Floating
Amid—Amidships
Atmtc—Automatic
B & P—Ball and Plain
B & R—Ball and Roller
B R & P—Ball, Roller and Plain
Cant—Cantilever
Circ-Spl—Circulating Splash
Dual-D—Dual Double
Ell—Elliptic
F—1 Valve in Head, 1 in Side
Float—Floating
Fric—Friction
Gear—Gear Pump
H & A—Hand and Automatic
I—I-Head
K—Knight Type
L—L-Head
Mag—Magnetic
Non-Cir—Non-Circulating Splash
Opt—Optional
Plat—Platform

Their Technical Specifications—Continued.

TRANSMISSION							Gear Ratio on Direct	RUNNING GEAR				Make of Steering Gear	Make of Speedometer	Crankshaft Bearings and No.	BEARINGS			MAKE AND MODEL
GEARSET			Final Drive	Torque Taken By	Make of Rear Axle	Rear Axle Type		TIRES		Wheels	Rear Springs				Gear Set	Rear Axle	Front Wheel	
Make	Location	Speeds						Front	Rear									
Own	Unit E.	3	Sp.B.	Springs.	Own	¾ Float.	4.07	34x4½	34x4½	Wire	S-E	Jacox	Stewart	Plain 3	Ball	Ball	Ball	Haynes 46
Fuller	Unit E.	3	Sp.B.	Springs.	Own	Float	4.41	32x4	32x4	Opt	Cant	T.W.Warner	Stewart	Plain 3	Ball	Ball	Ball	Hollier 206-B
Brown-Lipe	Unit E.	3	Sp.B.	Springs.	Timken	Semi-F.	4.90	34x4½	34x4½	Wood	Ell	Gemmer	VanSicklen	Plain 7	Roller	Roller	Roller	Holmes
Own	Unit E.	3	Sp.B.	Springs.	Timken	Semi-F.	4.45	34x4½	34x4½	Opt	S-E	Gemmer	Stewart	Plain 4	Roller	Roller	Roller	Hudson O
Own	Unit E.	3	Sp.B.	Springs.	Own	¾ Float.	4.87	32x4	32x4	Wood	S-E	Jacox	VanSicklen	Plain 3	B.R.P.	B.&R.	Ball	Hupmobile R-3
Grant-Lees.	Unit E	3	Sp.B.	Springs.	Stanpar	¾ Float.	4.50	34x4	34x4	Opt	S-E	C.A.S.	Stewart	Plain	Ball	Roller	Roller	Jones 28
Detroit	Unit E.	3	Sp.B.	Springs.	Timken	Semi-F.	4.66	32x4	32x4	Wood	S-E	Gemmer	VanSicklen	Plain 4	B.&P.	Roller	Roller	Jordan M
Detroit	Unit E.	3	Sp.B.	Springs.	Timken	Semi-F.	4.08	32x4½	32x4½	Wood	S-E	Gemmer	VanSicklen	Plain 3	B.&P.	Roller	Roller	Jordan F
Own	Unit E.	3	Sp.B.	Springs.	Columbia	¾ Float.	4.08	32x4½	32x4½	Opt	Cant	Jacox	VanSicklen	Plain 3	Ball	Roller	Ball	King H
Warner	Unit E.	3	Sp.B.	Springs.	Own	Float	3.62	32x4½	32x4½	Wire	¾-Ell	Jacox	Stewart	Plain 3	Plain	Roller	Roller	Kissel 45
Grant-Lees.	Unit E.	3	Sp.B.	Springs.	Stanpar	Float	4.50	33x4	33x4	Wood	¾-Ell	Wohlrab		Plain 4	Roller	Roller	Roller	Kline 6-55-J
Warner	Unit E.	3	Sp.B.	Springs.	Own	Float	4.66	32x4	32x4	Wood	S-E	C.A.S.		Plain 4	B.&R.	Ball	Ball	Lexington S
Detroit	Unit E.	3	Sp.B.	Springs.	Timken	Semi-F.	4.66	32x4	32x4	Wood	S-E	Gemmer	Stewart	Plain 4	B.&P.	Roller	Roller	Liberty 10-C
Own	Amid.	4	Sp.B.	R-R.,T-A.	Own	Float	3.80	35x5	35x5	Wood	¾-Ell	Own	Stewart	Plain 7	Ball	Ball	Roller	Locomobile 48
Muncie	Unit E.	3	Sp.B.	Springs.	Peru	Float	4.50	32x3½	32x3½	Wood	S-E	Jacox	Stewart	Plain 3	Ball	Roller	Roller	Maibohm B
Own	Unit T.	3	Sp.B.	Rad-Rd.	Own	¾ Float.	3.75	32x4½	32x4½	Wire	Trans	Own	VanSicklen	Plain 3	B.R.P.	B.&R.	Roller	Marmon 34
Own	Unit E.	3	Bevel	Springs.	Own	¾ Float.		30x3½	30x3½	Wood	S-E	Own		Plain 2	Roller	Roller	Ball	Maxwell 25
Brown-Lipe	Amid.	3	Sp.B.	Springs.	Timken	Float	3.58	35x5	35x5	Opt	S-E	T.W.Warner	Stewart	Plain 4	Roller	Roller	Roller	McFarlan 127
Own	Amid.	4	Sp.B.	Springs.	Own	Float	3.22	32x4½	32x4½	Opt	S-E	Gemmer	Stewart	Plain 3	Roller	B.&R.	Roller	Mercer 5
Own	Amid.	4	Sp.B.	Springs.	Stanpar		4.41	32x4½	32x4½	Wire	S-E	Gemmer	Stewart	Plain	Ball	Roller	Roller	Meteor
Brown-Lipe	Unit E.	3	Sp.B.	Springs.	Timken	¾ Float.	4.63	32x4	32x4	Wood	S-E	Warner		Plain 3	Ball	Roller	Roller	Metz
Own	Amid.	3	Sp.B.	Springs.	Own	Float	4.41	33x4	33x4	Wood	Cant	Own	Stewart	Plain 3	B.&R.	B.&R.	Roller	Mitchell F-40
Brown-Lipe	Unit E.		Sp.B.	Springs.	Salisbury	Semi-F.	4.75	32x4	32x4	Opt	S-E	Jacox	Stewart	Plain 3	B.R.P.	B.&R.	Roller	Moline-Knight R
Brown-Lipe	Unit E.	3	Sp.B.	Springs.	Timken	Semi-F.	4.90	32x4½	32x4½	Opt	S-E	Jacox	Stewart	Plain 3	B.&R.	Roller	Roller	Moline-Knight J
Muncie	Unit E.	3	Sp.B.	Tor-A.	Own	¾ Float.	4.50	32x3½	32x3½	Wood	Cant	C.A.S.	Stewart	Plain 2	Ball	Roller	Roller	Monroe
Brown-Lipe	Unit E	3	Sp.B.	Springs.	Timken	Semi-F.	4.75	32x4	32x4	Opt	S-E	Warner	VanSicklen	Plain 4	Ball	Roller	Roller	Moon Victory
Brown-Lipe	Unit E.	3	Sp.B.	Springs.	Timken	¾ Float.	4.45	33x5	33x5	Opt	S-E	Warner	VanSicklen	Plain 4	Ball	Roller	Roller	Moon 6-68
Own	Unit E.	3	Sp.B.	Springs.	Own	Semi-F.	4.50	33x4	34x4½	Wood	S-E	Gemmer	Stewart	Plain 3	Roller	Roller	Roller	Nash 681-2-4-5-6-7
Brown-Lipe	Unit E.	3	Sp.B.	Springs.	Columbia	Float	4.08	32x4½	32x4½	Wood	S-E	Warner	Stewart	Plain 3	B.&R.	Roller	Roller	National Sextet
Own	Unit A.	3	Sp.B.	Tor-A.	Own	Float	4.25	32x4	32x4	Wood	Trans	Own	Stewart	Plain 2	B.&R.	B.&R.	Ball	Nelson D
Detroit	Unit E.	3	Sp.B.	Springs.	Timken	¾ Float		32x4½	32x4½	Wire	S-E	Lavine		Plain 4	Ball	Roller	Roller	Noma 1-B
Muncie	Unit E.	3	Bevel	Springs.	West-M.	Float	4.50	32x4	32x4	Opt	S-E	Lavine	Stewart	Plain 3	B.&P.	B.&R.	Ball	Oakland 34-C
Northway	Unit E.	3	Sp.B.	Springs.	West-M.	Float	4.58	32x4	32x4	Wood	S-E	Jacox	Stewart	Plain 3	B.&R.	B.&R.	Roller	Oldsmobile 37-A
Warner	Unit E.	3	Sp.B.	Springs.	West-M.	Float	4.91	33x4½	33x4½	Wood	Plat	Jacox	Stewart	Plain 2	Ball	B.&R.	Ball	Oldsmobile 45-B
Own	Unit E.	3	Sp.B.	Springs.	Own	¾ Float.	4.50	30x3½	30x3½	Wood	Cant	Own		Plain 3	Ball	Ball	Roller	Overland 4
Own	Amid.	3	Sp.B.	Springs.	Own	Semi-F.	4.36	35x5	35x5	Wood	S-E	Own	Waltham	Plain 3	Ball	Ball	Roller	Packard 335
																		Packard
Own	Unit E.	3	Sp.B.	Springs.	Salisbury	¾ Float.	4.50	32x4	32x4	Wood	S-E	Jacox	Stewart	Plain 3	B.R.P.	B.&R.	Roller	Paige 6-42
Own	Unit E.	3	Sp.B.	Tor-A.	Salisbury	¾ Float.	4.33	33x4½	33x4½	Wood	Cant	Jacox	Stewart	Plain 3	B.R.P.	Roller	Roller	Paige 6-55
Durston	Unit E.	3	Sp.B.	Springs.	Stanpar	Semi-F.	4.50	33x4	33x4	Wood	S-E	Jacox	Stewart	Plain 3	Ball	Roller	Roller	Paterson 6-47
Brown-Lipe	Unit E.	3	Sp.B.	Springs.	Timken	Semi-F.	4.54	34x4½	34x4½	Wood	Plat	Gemmer		Plain 3	B.&R.		Roller	Peerless 56
Grant-Lees.	Unit E.	3	Sp.B.	Springs.	Spacke	¾ Float.	4.45	32x4	32x4	Wood	S-E	Warner	Stewart	Plain 4	Roller	Roller	Roller	Piedmont 6-40
Grant-Lees.	Unit E.	3	Sp.B.	Springs.	Peru	Float	4.45	32x3½	32x3½	Wood	S-E	Ditweiller	Stewart	Plain 3	B.&R.	B.&R.	Roller	Piedmont
Own	Amid.	4	Sp.B.	Springs.	Own	Semi-F.	3.78	34x4½	34x4½	Wood	¾-Ell	Own	Waltham	Plain 7	Ball	B.&R.	Roller	Pierce-Arrow 31

Rad-Rd—Radius Rods
S-E—Semi-Elliptic
Semi-F—Semi-Floating
Sp.B—Spiral Bevel
Splash-Pr—Splash Pressure
Spur—Spur Gears
T—T-Head
Ther—Thermo-Syphon
Tor-A—Torsion Arm
Tor-T—Torsion Tube
Trans—Transverse
Unit-A—Unit with Axle
Unit-E—Unit with Engine
Unit-T—Unit with Torque Tube

EQUIPMENT

At Kent—Atwater Kent
G. & D.—Gray & Davis
Hersh-Sp—Herschell-Spillman
Johns-Man—Johns-Manville
Leece-N—Leece-Neville
Teet-Hart—Teetor-Hartley
Ward-L—Ward Leonard
West-M—Weston-Mott

1920 Passenger Automobiles Listed with

MAKE AND MODEL	Wheelbase	Number of Cylinders	Bore and Stroke	Piston Displacement	Make of Engine	Cylinder Shape	Cam-shaft Drive	Water Circu-lation	LUBRICATION		CARBURETION		IGNITION			ELECTRIC SYSTEM		CLUTCH	
									System	Type of Pump	Make of Carbu-reter	Fuel Feed	Sys-tem	Make	Con-trol	Generator Make	Voltage	Make	Type
Pierce-Arrow.....51	142	6	4½x5½	524.8	Own.....	T...	Helical.	Pump..	Pressure..	Gear.....	Own.....	Pressure...	Dual-D..	Delco.....	H. & A.	Westinghouse	6	Own.....	Cone..
Pilot.....6-45	120	6	3⅛x5	230.1	Teet.-Hart..	L...	Helical.	Pump..	Splash-Pr.	Gear.....	Tillotson..	Vacuum...	Single...	Delco.....	Hand..	Delco.....	6	Borg & Beck	Plate..
Porter.....45	142	4	4⅜x6¾	448.7	Own.....	I...	Worm..	Pump..	Splash-Pr.	Piston....	Zenith....	Pressure...	Double..	Berling....	Hand..	Westinghouse	12	Hele-Shaw...	Plate..
Premier.....6-D	126¾	6	3⅜x5½	295.3	Own.....	I...	Helical.	Pump..	Splash-Pr.	Gear.....	Johnson...	Vacuum...	Single...	Delco.....	Atmtc..	Delco.....	6	Borg & Beck	Plate..
Reo.....T-6	120	6	3 7/16x5	239.4	Own.....	F...	Helical.	Pump..	Circ-Spl..	Eccentric.	Rayfield...	Vacuum...	Dual....	Northeast..	Hand..	Northeast....	6	Own.....	Plate..
Revere.....C	131	4	4⅜x6	360.8	.....	....	Chain..	Pump..	Splash-Pr.	Gear.....	Stromberg.	Vacuum...	Single...	Bosch.....	Hand..	Westinghouse	6	Brown-Lipe..	Disk..
Roamer.....6-54	128	6	3½x5¼	303.1	Continental.	I...	Helical.	Pump..	Splash-Pr.	Piston....	Stromberg.	Vacuum...	Single...	Bosch.....	Hand..	Bijur.....	6	Borg & Beck.	.....
Scripps-Booth.....B	115	6	2 11/16x4¾	177.0	Northway..	I...	Helical.	Pump..	Splash-Pr.	Gear.....	Marvel....	Vacuum...	Single...	.....	Hand..	Remy.....	6	Northway...	Cone..
Seneca.....L	108	4	3⅛x4½	138.1	LeRoi.....	L...	Spur...	Ther...	.....	.....	Schebler...	Vacuum...	Single...	.....	Hand..	Allis-Chal...	6	Borg & Beck.	Plate..
Singer.....20	138	12	2⅞x5	389.5	Weidely....	I...	Helical.	Pump..	Pressure..	Gear.....	Stromberg.	Vacuum...	Single...	Philbrin...	Hand..	Westinghouse	6	Covert.....	Disk..
Spacke.....S-20	90	2	3½x3⅜	69.3	Own.....	F...	Helical.	Air....	Non-Circ.	Piston....	Carter....	Gravity...	Single...	.....	Hand..	.....	6	Own.....	Fric...
Standard.....I	127	8	3¼x5	331.8	Own.....	L...	Helical.	Pump..	Pressure..	Gear.....	Zenith....	Vacuum...	Double..	At Kent...	Hand..	Westinghouse	6	Borg & Beck.	Plate..
Stearns.....SKL4	125	4	3⅜x5⅝	248.5	Own.....	K...	Chain..	Pump..	Pressure..	Gear.....	Schebler...	Vacuum...	Single...	At Kent...	Hand..	Westinghouse	12	Own.....	Disk..
Stephens.....80	122	6	3¼x4½	224.0	Own.....	I...	Helical.	Ther...	Pressure..	Gear.....	Tillotson..	Vacuum...	Single...	Auto-Lite..	Hand..	Auto-Lite....	6	Borg & Beck.	Plate..
Studebaker.....EJ	112	6	3½x4½	207.1	Own.....	L...	Chain..	Pump..	Splash-Pr.	Gear.....	Stromberg.	Vacuum...	Single...	Wagner...	.....	Wagner.....	6	Own.....	Plate..
Studebaker.....EH	119	6	3½x5	288.6	Own.....	L...	Helical.	Pump..	Splash-Pr.	Gear.....	Stromberg.	Vacuum...	Single...	Wagner...	Hand..	Wagner.....	6	Own.....	Cone..
Studebaker.....EG	126	6	3⅞x5	353.8	Own.....	L...	Helical.	Pump..	Splash-Pr.	Gear.....	Ball.....	Vacuum...	Single...	Wagner...	Hand..	Wagner.....	6	Own.....	Cone..
Stutz.....H	130	4	4⅜x6	360.8	Own.....	T...	Helical.	Pump..	Pressure..	Gear.....	Stromberg.	Pressure...	.....	Delco.....	Hand..	Remy.....	6	Own.....	Cone..
Templar.....445	118	4	3⅜x5½	196.8	Own.....	I...	Chain..	Pump..	Pressure..	Gear.....	Stromberg.	Vacuum...	Single...	Simms....	Hand..	Bijur.....	6	Borg & Beck.	Plate..
Tulsa.....E	117½	4	3½x5	192.4	Hersh-Sp...	....	Helical.	Ther...	Circ-Spl..	Gear.....	.....	.....	Single...	.....	Hand..	Dyneto.....	6	Borg & Beck.	Plate..
Velie.....34	112	6	3⅛x4¼	195.6	Falls.....	I...	Helical.	Ther...	Splash-Pr.	Piston....	Rayfield...	Vacuum...	Single...	At Kent...	H. & A.	Westinghouse	6	Borg & Beck.	Plate..
Velie.....48	115	6	3¼x4½	224.0	Continental.	L...	Helical.	Pump..	Pressure..	Gear.....	Rayfield...	Vacuum...	Single...	At Kent...	H. & A.	Bijur.....	6	Borg & Beck.	Plate..
Westcott.....C-38	118	6	3¼x4½	224.0	Continental.	L...	Helical.	Pump..	Splash-Pr.	Gear.....	Rayfield...	Vacuum...	Single...	Delco.....	H. & A.	Delco.....	6	Borg & Beck.	Plate..
Westcott.....C-48	125	6	3½x5¼	303.1	Continental.	L...	Helical.	Pump..	Splash-Pr.	Gear.....	Rayfield...	Vacuum...	Single...	Delco.....	H. & A.	Delco.....	6	Borg & Beck.	Plate..
Winton.....25	132	6	3¾x5¼	347.9	Own.....	L...	Chain..	Pump..	Pressure..	Gear.....	Stromberg.	Vacuum...	Single...	Bosch.....	Hand..	Bijur.....	6	Own.....	Disk..

ABBREVIATIONS

2-pt—Two Point
¾ Ell—¾ Elliptic
¾ Float—¾ Floating
Amid—Amidships
Atmtc—Automatic
B & P—Ball and Plain
B & R—Ball and Roller
B R & P—Ball, Roller and Plain
Cant—Cantilever
Circ-Spl—Circulating Splash
Dual-D—Dual Double
Ell—Elliptic
F—1 Valve in Head, 1 in Side
Float—Floating
Fric—Friction
Gear—Gear Pump
H & A—Hand and Automatic
I—I-Head
K—Knight Type
L—L-Head
Mag—Magnetic
Non-Clr—Non-Circulating Splash
Opt—Optional
Plat—Platform

Specifications of British Tractors

Name	Type	Price ($4 to £1)	Plow Capacity (Furrows)	Plowing Speed (m. p. h.)	Engine Make	Number of Cylinders	Bore and Stroke (in)	Normal r. p. m	Engine Type	Engine Weight (lb.)	Lubrication System	Type of Oil Pump	Ignition	Impulse Starter	Make of Carbureter	Fuel	Water Injection	Fuel Feed
Alldays.....	Wheel...	2520	3	2	Own.....	4	4x5	1050	Vertical..	.....	Pressure.....	Gear....	Mag.....	No....	Sthenos.....	Gasolene ..	No....	Gravity..
Austin.....	Wheel...	1200	3	2½	Own.....	4	3¾x5	1200	Vertical..	.....	Pressure.....	Gear....	Mag.....	No....	Zenith.....	Kerosene..	No....	Gravity..
Clayton.....	Chn.Trk.	2200	4	1.8	Dorman....	4	4 3/16x5½	1000	Vertical..	1008	Pressure.....	Gear....	Mag.....	No....	Capac.....	Kerosene..	No....	Gravity..
Blackstone.....	Chn. Tk.	2000	3	2	Own.....	3	5x6½	750	Vertical..	.....	Pressure.....	.....	L. T. Mag.	No....	Own.....	Kerosene..	No	Pressure.
Crawley (*a*).....	Wheel...	2000	3	2¾	.....	4	4½x5½	1000	Vertical..	.....	Circ. and splash.....	Plunger .	Mag.....	No....	Rayfield.....	Gasolene ..	No....	Gravity..
Glasgow (*b*).....	Wheel...	1800	3	2	Continental.	4	4½x5¼	1100	Vertical..	600	Circ. and splash	Plunger .	Mag.....	No....	Zephyr.....	Gasolene ..	No....	Gravity..
Martin.....	Wheel...	1800	3	2½	Galloway...	4	4¼x5½	1000	Vertical..	900	Press. and splash ...	Plunger .	Mag.....	Yes...	Holley.....	Kerosene..	No....	Gravity..
Martin (*c*).....	Chn.Trk.	1600	3	2¼	Galloway...	4	4¼x5½	1000	Vertical..	900	Press. and splash ...	Plunger .	Mag.....	Yes...	Holley.....	Kerosene..	No....	Gravity..
Omnitractor.....	Wheel...	2600	4	2¾	Own.....	2	6½x9	750	Vertical..	.....	Pressure.....	Gear....	Mag.....	No....	White&Poppe..	Kerosene..	Yes...	Pressure.
Pick (*d*).....	Drum....	2200	3	2½	Own.....	4	4⅜x5	800	Vertical..	.....	Press. and splash ...	Gear....	Mag.....	No....	.....	Gasolene ..	No....	Gravity..
Saunderson (*e*)....	Wheel...	2400	3	2	Own.....	2	5½x8	750	Vertical..	1250	Pressure.....	Gear....	Mag.....	No....	Own.....	Kerosene..	No	Gravity..
Weeks.....	Wheel...	1600	3	2¾	Own.....	4	4½x5¾	900	Vertical..	.....	Press. and splash...	Gear....	Mag.....	No....	Zenith.....	Kerosene..	No....	Gravity..

(*a*) Self-contained motor plow.
(*b*) All wheel drive
( ) Combination motor plow.
)(*d*) Experimental model only Angle-iron cross members connect driving-wheels on land, making latticed drum.
e) Engine set transversely in frame.

Their Technical Specifications—Continued.

TRANSMISSION							Gear Ratio on Direct	RUNNING GEAR				Make of Steering Gear	Make of Speedometer	Crankshaft Bearings and No.	BEARINGS			MAKE AND MODEL
GEARSET			Final Drive	Torque Taken By	Make of Rear Axle	Rear Axle Type		TIRES		Wheels	Rear Springs				Gear Set	Rear Axle	Front Wheel	
Make	Location	Speeds						Front	Rear									
Own	Amid.	4	Sp.B.	Springs.	Own.	Semi.	3.53	35x5	35x5	Wood.	¾-Ell.	Own.	Waltham.	Plain 7.	Ball.	B.&R.	Roller.	Pierce-Arrow 51
Muncie	Unit E.	3	Sp.B.	Springs.	Spacke.	¾ Float.	4.90	32x4	32x4	Opt.	Cant.	Ditweiler.	Stewart.	Plain 3.	Ball.	B.&R.	Roller.	Pilot 6-45
Own	Amid.	4	Bevel.	Sprin s.	Own.	Float.	3.00	35x5	35x5	Wood.	S-E.	Own.	Stewart.	Plain 3.	Ball.	Ball.	Ball.	Porter 45
Own	Unit E.	3	Sp.B.	Springs.	Stanpar.	Semi-F.	4.50	32x4½	32x4½	Wood.	S-E.	Opt.	Stewart.	Plain 3.	B.R.P.	Roller.	Roller.	Premier 6-D
Own	Amid.	3	Sp.B.	Springs.	Own.	Semi-F.	4.66	33x4	33x4	Wood.	S-E.	Own.		Plain 4.	Roller.	Roller.	Roller.	Reo T-6
Brown-Lipe.	Unit E.	4	Sp.B.	Tor-A.	Stanpar.	Float.	3.44	32x4½	32x4½	Wire.	Ell.	Gemmer.		Plain 2.	Roller.	Roller.	Roller.	Revere C
Grant-Lees.	Unit E	3	Sp.B.	Tor-A.	Stanpar.	¾ Float.		32x4	32x4	Wire.	S-E.	Jacox.	Stewart.	Plain 3.	Ball.	Roller.	Roller.	Roamer 6-54
Warner	Unit E.	3	Bevel.	Springs.	West-M.	Float.	4.50	32x4	32x4	Wood.	S-E.	Jacox.	Stewart.	Plain 3.	Plain.	B.&R.	Ball.	Scripps-Booth B
Borg & Beck.	Unit E.	3	Bevel.	Springs.	Peru.	Float.	4.50	30x3	30x3	Opt.	Cant.	Ditweiler.		Plain.	B.&F.	B.&R.	Roller.	Seneca L
Covert	Unit E.	3	Sp.B.	Springs.	Timken.	Float.	3.77	33x5	33x5	Wire.	Cant.	Ross.	Stewart.	Plain 3.	B.&P.	Roller.	Roller.	Singer 20
Own	Amid.	2	Bevel.	Springs.	Own.	Live.	5.09	28x3	28x3	Wire.	Cant.	Own.		Ball 2.	Ball.	Ball.	Ball.	Spacke S-20
Grant-Lees.	Unit E.	3	Sp.B.	Springs.	Timken.	Semi-F.	4.45	34x4½	34x4½	Wood.	S-E.	Gemmer.	Stewart.	Plain 3.	Ball.	Roller.	Roller.	Standard I
Own	Unit E.	3	Sp.B.	Springs.	Own.	Semi-F.	4.50	34x4½	34x4½	Wood.	Cant.	Own.	VanSicklen.	Plain 3.	B.&R.	B.&R.	Roller.	Stearns SKL4
Mechanics.	Unit E.	3	Sp.B.	Springs.	Stanpar.	Semi-F.	4.75	33x4½	33x4½	Wood.	S-E.	C.A.S.	Stewart.	Plain 3.	B.&P.	Roller.	Roller.	Stephens 80
Own	Amid.	3	Sp.B.	Springs.	Own.	Semi-F.	4.55	32x4	32x4	Wood.	S-E.	Own.	VanSicklen.	Plain 4.	Roller.	Roller.	Roller.	Studebaker EJ
Own	Amid.	3	Sp.B.	Springs.	Own.	Semi-F.	4.33	32x4	32x4	Wood.	S-E.	Own.	VanSicklen.	Plain 4.	Roller.	Roller.	Roller.	Studebaker EH
Own	Amid.	3	Sp.B.	Springs.	Own.	Semi-F.	3.70	33x4½	33x4½	Wood.	S-E.	Own.	VanSicklen.	Plain 4.	Roller.	Roller.	Roller.	Studebaker EG
Own	Unit A.	3	Sp.B.	Tor-A.	Own.	Semi-F.	3.50	32x4½	32x4½	Wire.	S-E.	Gemmer.	Stewart.	Plain 3.	Ball.	B.&R.	Roller.	Stutz H
Detroit	Unit E.	3	Sp.B.	Springs.	American.	Semi-F.	4.40	33x4	32x4	Wood.	S-E.	C.A.S.	Stewart.	Plain 3.	Ball.	B.&R.	Roller.	Templar 445
Muncie		3	Bevel.		Salisbury.	¾ Float.	4.50	33x4	33x4	Wood.	S-E.	C.A.S.	Stewart.	Plain 2.		B.&R.	Roller.	Tulsa E
Durston	Unit E.	3	Sp.B.	Springs.	Columbia	¾ Float.	4.60	32x3½	32x3½	Wood.	S-E.	Gemmer.	VanSicklen.	Plain 3.	Ball.	Roller.	Roller.	Velie 34
Durston	Unit E.	3	Sp.B.	Springs.	Timken.	¾ Float.	4.66	32x4	32x4	Wood.	¾-Ell.	Gemmer.	VanSicklen.	Plain.	Ball.	Roller.	Roller.	Velie 48
Warner	Unit E.	3	Sp.B.	Springs.	Timken.	Semi-F.	5.09	33x4	33x4	Wood.	S-E.	Gemmer.	VanSicklen.	Plain 4.	B.&R.	Roller.	Roller.	Westcott C-38
Brown-Lipe	Unit E.	3	Sp.B.	Springs.	Timken.	Semi-F.	4.45	32x4½	32x4½	Wood.	S-E.	Gemmer.	VanSicklen.	Plain 3.	B.&R.	Roller.	Roller.	Westcott C-48
Own	Unit E.	3	Sp.B.	Springs.		Float.	4.90	35x5	35x5	Opt.	S-E.		Stewart.	Plain 4.	B.&R.	Roller.	Roller.	Winton 25

Rad-Rd—Radius Rods
S-E—Semi-Elliptic
Semi-F—Semi-Floating
Sp.B—Spiral Bevel
Splash-Prs—Splash Pressure
Spur—Spur Gears
T—T-Head
Ther—Thermo-Syphon
Tor-A—Torsion Arm
Tor-T—Torsion Tube
Trans—Transverse
Unit-E—Unit with Engine
Unit-T—Unit with Torque Tube
Unit-A—Unit with Axle

EQUIPMENT

At Kent—Atwater Kent
G. & D.—Gray & Davis
Hersh-Sp—Herschell-Spillman
Johns-Man—Johns-Manville
Leece-N—Leece-Neville
Teet-Hart—Teetor-Hartley
Ward-L—Ward Leonard
West-M—Weston-Mott

with Internal Combustion Engines

Air Cleaner	Water Circulation	Belt Pulley		Type of Clutch	Number of Speeds	Final Drive	Number of Tracks	Number of Driving Wheels	Diam. and width driving wheels	Axle Type	Differ. Lock	Number of non drivin. wheels	Wheelbase	Type of Steering	Frame Construction	Engine and Gearset	Total weight (lb.)
		Diameter and Width	Speed (r.p.m.)														
No.	Pump.	11¼x6½	730	Cone.	3	Chain	2	2	60x12	Stationary.	No.	2	90	Knuckle	Rolled channel	Separate.	6380
Yes.	Thermo.	24x6	360	Cone.	2	Double reduc.	2	2	42x10	Live	No.	2	68	Knuckle	Frameless	Unit.	2900
No.	Pump.	8½x7½	1000	Cone.	2	Sprocket	2	Chn. trk.	Trk. 72x14				72	Clutches on tracks.	Stamped steel channel.	Separate.	6300
No.	Pump.	12x6½	750		3	Sprocket	2	Chn. trk.	Trk. 52x7				52	Clutches on tracks.	Rolled channel	Unit.	5600
No.	Pump.	14x16	500	Cone.	2	Spur gears	2	2	48x8	Stationary.	No.	None.		Clutches on wheels.	Rolled channel	Separate.	4260
Yes.	Pump.	9x5	1100	Cone.	2	Bevel	3	3	39x9F 39x12R	Live	No diff.	None.	75	Knuckle	Frameless	Unit.	3700
Yes.	Pump.	18x6½		Cone.	3	Internal gears.	2	2	51x10	Stationary.	No.	2	86	Knuckle	Rolled channel	Separate.	3200
Yes.	Pump.			Cone.	1	Spur gears	2	Chn.trk.	Trk. 8 in. wide.					Clutches on tracks.	Rolled channel	Separate.	4500
Yes.	Pump.	15x6½	750	Cone.	2	Spur gears	2	2	60x15	Stationary.	Yes.	2	96	Knuckle	Rolled channel	Unit.	7300
No.	Pump.				1	Spur gears	3	2	30x6	Stationary.	No diff.	1		Central pivot	Rolled channel	Separate.	4480
Yes.	Thermo.	12x7	750	Cone.	3	Spur gears	2	2	48x10	Live	Yes.	2	90	Knuckle	Rolled channel	Separate.	5600
No.	Pump.	8x6	900	Plate.	3	Internal gears.	2	2	40x10	Stationary.	No.	2	66	Knuckle	Rloled channel	Separate.	3700

British Tendencies in

ACCOMPANYING this article is a table of specifications of fifty British car models exhibited at the recent Olympia Show. It is interesting to analyze this table to see in what respects British design differs from Continental and American design, also analyzed in this issue.

There is in England today no standard tread, cars being built in all full inch-size treads from 45 to 58, with the sole exception of 53-in. It is true that more cars have a 56-in. tread than any other size, but the proportion with this tread is only 23.6 per cent of the whole. That there is a very considerable proportion of narrow-gage vehicles being built in England is shown by the fact 11.7 per cent of the cars have a 46 in. tread, and the same per cent a 48 in. tread.

In England, as in Continental Europe, there is a goodly proportion of cars with a piston displacement of less than 100 cu. in. The average wheelbase of the 50 British cars is substantially the same as that of the French, viz., 100.8 in. For larger sized cars, the British makers provide an engine of greater piston displacement, as the average wheelbase of all cars with between 100 and 149.9 cu. in. piston displacement is 120.6 in., and that of those over 200 cu. in. piston displacement, 128 in., all these figures relating to 4-cylinder models. The 6-cylinder cars with a piston displacement up to 300 cu. in. have an average wheelbase of 129.5 in., and those of over 300 cu. in. displacement, of 140.5 in., which figures also are slightly less than the corresponding ones for the French cars.

The 6-cylinder engine was first put in production in Great Britain, and it is, therefore, not to be wondered at that it has attained a considerable popularity there, as shown by the fact that 25.5 per cent of the models listed carry that kind of engine. The 4-cylinder engine holds the lead with 66.7 per cent, and 4 per cent of all the cars are 2-cylinder models, the list being completed by one 5-cylinder and one 8-cylinder machine.

As in Continental Europe, the T-head cylinder has passed away and not a single one of the 50 machines for which specifications are given is equipped with that type of cylinder. Roughly speaking, there are twice as many L-head cylinders in use as valve-in-head cylinders, while the sleeve-valve type forms a smaller percentage.

Detachable cylinder heads are meeting with great favor among British designers, and are now represented in nearly the same proportion as integral cylinder heads. The British evidently also have taken up with avidity the aluminum piston, which seems to have passed its zenith in this country. Of the 50 British models listed, 36.8 per cent have aluminum pistons; 61.2 per cent cast iron pistons, and the remaining 2 per cent steel pistons. Pressure lubrication has overtaken the circulating splash system, substantially 55 per cent of the cars being equipped with the former and 45 per cent with the latter.

The vacuum fuel feed system is not nearly as prevalent in Great Britain as it is in Continental Europe at the present, only 28 per cent of the British cars having this system. Gravity feed is still being used on 58 per cent of the cars, which is probably due to the fact that cowl tanks are very popular in England, especially on the smaller cars. The remaining 34 per cent use pressure feed. Magneto ignition is still almost universal, 96.3 per cent of the cars depending upon the magneto alone, and another 5.9 per cent carry a magneto and in addition are fitted with a battery system. Only 7.8 per cent of the cars have battery ignition alone.

British manufacturers have not gone in for the unit power plant as strongly as their Continental confrères, for only 20 per cent of the cars have the transmission in a unit with the engine. In 76 per cent the transmission still forms a separate unit, and is located amidships, while in the remaining 4 per cent the gear box forms a unit with the rear axle. Disk and cone clutches almost equally divide the field between them, the cone clutches remaining slightly in the lead. Four-speed gear sets are more prevalent than three-speed, the former being on 58.8 per cent of the cars, against 41.2 per cent for the latter. No one uses a two-speed gear.

As regards the location of the control levers, British practice must be looked at in the light of the fact that in England the rule of the road is the reverse from what it is in practically every other part of the world, British motorists and horse drivers always keeping to the left, instead of to the right. Consequently, British designers prefer the right-hand steering column, the same as we prefer the left-hand column. Center-mounted control levers are also coming into favor in England, but with the driver being seated on the right, he has to operate center-control levers with his left hand, which is a disadvantage. Roughly, twice as many cars have the control levers mounted on the side, which means the right-hand side, as in the center.

In respect to final drives, the situation in England is also somewhat peculiar, British manufacturers pioneered the worm drive and applied it both to passenger cars and trucks. At one time it looked as though the worm would secure a hold in the passenger car field also in Continental Europe and in the United States, but that was before the days of the spiral bevel gear. The chief advantage of the worm is its quiet operation. Just as quiet operation can be obtained with spiral bevel gears, and as the latter is, undoubtedly, more efficient and requires less careful mounting. it is difficult to see why any one should want to use the worm final drive for passenger cars. In Great Britain. however, the worm shares the field substantially equally with the spiral bevel and the straight bevel gear. Of course, the spiral bevel gear is new there and its manufacture calls for the installation

Cylinder Number	
4-cylinder	66.7
6-cylinder	25.5
2-cylinder	4 0
5-cylinder	1.9
8-cylinder	1.9

Cylinder Type	
L head	62.7
Valve in head	31.4
Sleeve valve	5.9

Cylinder Heads	
Integral	52
Detachable	48

Piston Material	
Cast iron	61.2
Aluminum	36.8
Steel	2

Lubricating Systems	
Pressure	54.9
Circulating splash	45.1

Fuel Feed	
Gravity	48
Vacuum	28
Pressure	24

Ignition	
Magneto alone	86 3
Battery alone	7.8
Magneto and battery	5.9

Gearset Location	
Amidships	76
On engine	20
On axle	4

Clutch Types	
Cone	50.9
Disk	49.1

Number of Speeds	
Four speeds	58.8
Three speeds	41.2

Control Location	
Side	66
Center	32
Optional	2

Final Drive	
Worm	35.4
Spiral bevel	33.3
Straight bevel	31.3

Rear Springs	
Half elliptic	43
Cantilever	27.4
Three-quarter elliptic	15.7
Quarter elliptic	12
Elliptic	1.9

Passenger Car Design

of special machinery, while the machinery for cutting worms and wheels was at hand. In another year there may be a different story to tell.

In rear springs the half elliptic and the cantilever types predominate, exactly as on the Continent, but the three-quarter elliptic is not yet dead, as it is on the Continent, being still found on 15.7 per cent of the cars. The quarter elliptic also has a rather remarkable representation, 12 per cent, while the full elliptic is a rarity, being represented on but one model.

Specifications of British Passenger Cars

MAKE	Wheelbase (In.)	Track (In.)	Number of Cylinders	Cylinder Shape	Cylinder Head	Bore and Stroke (Mm.)	Bore-Stroke Ratio	Piston Displacement (Cu.In.)	Piston Material	Horsepower (Nominal)	Lubricating System	Carbureter Make	Fuel Feed	Ignition	Gearset Location	Clutch	Speeds	Position of Levers	Final Drive	Gear Ratio on Direct	Rear Springs
A.B.C.	102	47	2	I.	Det.	92x 92	1.00	74	Al.	12	Cir.	.....	Grav.	Magneto	Amid.	Disk.	4	Cent.	Bev.	4–1	¼-Ellip.
A.C.	102	46	4	L.	.....	69x100	1.45	91	Al.	10	H-S.	Zenith	Grav.	Magneto	Amid.	Disk.	3	Opt.	W.	4.5–1	¼-Ellip.
A.C.	102	46	6	I.	Det.	65x100	1.54	121	Al.	12	H-S.	Zenith	Grav.	Magneto	Amid.	Disk.	3	Cent.	W.	4.5–1	¼-Ellip.
Albert	110	49	4	I.	Det.	68x103	1.51	91	C-I.	12	H-S.	.....	Grav.	Magneto	Amid.	Disk.	4	Cent.	Sp.B.	3.97–1	Canti.
Angus-Sanderson	120	52	4	L.	Det.	76x127	1.66	140	Al.	12	H-S.	Zenith	Grav.	Magneto	Unit-E.	Cone.	3	Cent.	Bev.	4.2–1	Canti.
Arrol-Johnston	120	56	4	I.	Det.	80x140	1.74	171	C-I.	13	H-S.	Zenith	Grav.	Magneto	Amid.	Cone.	4	Side.	Sp.B.	4–1	Canti.
Arrol-Johnston	120	56	4	L.	Int.	80x120	1.50	147	C-I.	16	H-S.	Zenith	Grav.	Magneto	Unit-E.	Disk.	4	Side.	Sp.B.	4–1	Ellip.
Austin	129	56	4	L.	Det.	95x127	1.33	219	Al.	20	H-S.	Zenith	Vac.	Magneto	Unit-E.	Disk.	4	Cent.	Sp.B.	3.92–1	½-Ellip.
Autocrat	108	48	4	L.	Int.	69x100	1.45	91	C-I.	12	H-S.	Zenith	Grav.	Magneto	Amid.	Disk.	3	Side.	Bev.	4.25–1	¾-Ellip.
Bean	102	49	4	L.	Int.	69x120	1.74	113	C-I.	12	H-S.	Zenith	Grav.	Magneto	Amid.	Cone.	3	Side.	Sp.B.	4.08–1	½-Ellip.
Calthorpe	99	45	4	L.	Int.	65x 9?	1.46	76	Al.	10	Cir.	Zenith	Grav.	Magneto	Amid.	D'sk.	3	Side.	Bev.	4.33–1	½-Ellip.
Crossley	135	54	4	L.	Int.	102x140	1.37	278	C-I.	30	H-S.	Smith	Vac.	Magneto	Amid.	Cone.	4	Side.	Bev.	4–1	¾-Ellip.
Cubitt	126	54	4	L.	Det.	80x140	....	171	.....	16	Cir.	Smith	Grav.	Battery	.....	Cone.	4	.....	W.	....	½-Ellip.
Daimler	128	56½	6	Sl.	Det.	90x130	1.44	301	C-I.	30	Cir.	Own	Pres.	Magneto	Amid.	Cone.	4	Side.	W.	3.55–1	¾-Ellip.
Daimler	140	56½	6	Sl.	Det.	90x130	1.44	301	C-I.	30	Cir.	Own	Pres.	Magneto	Amid.	Cone.	4	Side.	W.	3.77–1	¾-Ellip.
Daimler	146	56½	6	Sl.	Det.	110x130	1.18	451	C-I.	45	Cir.	Own	Pres.	Magneto	Amid.	Cone.	4	Side.	W.	3.77–1	¾-Ellip.
Dawson	105	51	4	I.	Det.	69x120	1.74	113	Al.	12	Cir.	Zenith	Grav.	Magneto	Amid.	Cone.	3	Side.	Sp.B.	4–1	½-Ellip.
Enfield-Allday	105	46	5	I.	Det.	63x 80	1.27	75	Al.	10	H-S.	.....	Pres.	Magneto	Unit-E.	Disk.	3	Cent.	Sp.B.	4–1	Canti.
Ensign	148	56½	6	I.	Det.	102x140	1.37	417	Al.	25	H-S.	Zenith	Pres.	Mag.&Batt.	Unit-E.	Disk.	3	Side.	Sp.B.	3.62–1	Canti.
Guy	130	56	8	L.	Det.	72x125	1.73	248	Al.	20	H-S.	.....	Vac.	Magneto	Amid.	Cone.	4	Side.	Sp.B.	....	½-Ellip.
Hillman	102	48	4	L.	Int.	65x120	1.84	97	C-I.	10	Cir.	Zenith	Grav.	Magneto	Amid.	Cone.	3	Cent.	W.	4.2–1	½-Ellip.
Humber	106	55	4	L.	Det.	65x120	1.84	97	C-I.	10	Cir.	Smith	Grav.	Magneto	Unit-E.	Cone.	4	Side.	Bev.	4.33–1	½-Ellip.
Humber	123	57	4	L.	Int.	80x140	1.74	171	Al.	15	H-S.	Smith	Vac.	Magneto	Amid.	Cone.	4	Side.	Bev.	4.33–1	½-Ellip.
Lagonda	93*	46	4	I.	Int.	67x 78	1.16	67	C-I.	11	Cir.	Zenith	Grav.	Magneto	Unit-E.	Cone.	3	Cent.	W.	4.1–1	¼-Ellip.
Lanchester	141*	58	6	I.	Int.	102x127	1.25	379	Al.	50	H-S.	Smith	.....	Mag.&Batt.	Unit-E.	Disk.	3	Side.	W.	....	Canti.
Morris	102	48	4	L.	Det.	69.5x102	1.45	94	C-I.	12	Cir.	Zenith	Grav.	Magneto	Unit-E.	Disk.	3	Cent.	Sp.B.	4.75–1	¾-Ellip.
Napier	137	56	6	I.	Det.	102x127	1.25	379	Al.	50	H-S.	Own	Pres.	Mag. & Batt.	Amid.	Disk.	4	Cent.	Sp.B.	3.3–1	Canti.
Phoenix	96	50	4	L.	Int.	69x100	1.45	91	C-I.	12	Cir.	S.U.	Grav.	Magneto	Amid.	Cone.	3	Side.	W.	4.14–1	½-Ellip.
Rolls-Royce	144	56	6	L.	Int.	114x121	1.06	451	....	50	H-S.	Own	Pres.	Mag. & Batt.	Amid.	Cone.	4	Side.	Bev.	3.25–1	Canti.
Rover	88	46	2	L.	Int.	85x 88	1.03	61	C-I.	8	Cir.	.....	Grav.	Magneto	Unit-E.	Disk.	3	Cent.	W.	4.84–1	Canti.
Rover	116	50	4	L.	Det.	75x130	1.73	139	C-I	12	Cir.	.....	Vac.	Magneto	Amid.	Disk.	3	Side.	W.	4.62–1	½-Ellip.
Ruston-Hornsby	107	56½	4	L.	Det.	80x130	1.62	159	C-I.	16	Cir.	Zenith	Grav.	Magneto	Unit-A.	Cone.	3	Cent.	Bev.	4.25–1	¾-Ellip.
Siddeley	135	56	6	I.	Int.	89x133	1.50	284	C-I.	30	H-S.	Zenith	Grav.	Magneto	Amid.	Disk.	3	Cent.	Sp.B.	3.69–1	Canti.
Standard	92	48	4	L.	Int.	62x110	1.77	81	C-I.	10	Cir.	Zenith	Vac.	Magneto	Amid.	Disk.	3	Side.	W.	4.7–1	½-Ellip.
Star	124	57	4	L.	Int.	*80x150	1.87	183	C-I.	16	H-S.	Zenith	Vac.	Magneto	Amid.	Disk.	4	Side.	Bev.	3.93–1	¾-Ellip.
Straker-Squire	126	55	6	I.	Int.	80x130	1.62	230	Al.	25	H-S.	Ware	Vac.	Magneto	Amid.	Disk.	4	Side.	Sp.B.	....	Canti.
Sunbeam	124	54	4	L.	Int.	80x150	1.87	183	C-I.	16	H-S.	Claudel.	Vac.	Magneto	Amid.	Cone.	4	Side.	Sp.B.	3.59–1	½-Ellip.
Sunbeam	137*	54	6	L.	Int.	80x150	1.87	275	C-I.	24	H-S.	S-U.	Vac.	Magneto	Amid.	Cone.	4	Side.	Sp.B.	3.59–1	½-Ellip.
Swift	108	48	4	L.	Int.	69x130	1.88	118	C-I.	12	H-S.	Zenith	Grav.	Magneto	Amid.	Cone.	4	Side.	Bev.	4.26–1	½-Ellip.
Talbot	113	52	4	L.	Int.	80x120	1.50	147	C-I.	12	H-S.	Own	Pres.	Magneto	Amid.	Cone.	4	Side.	Bev.	....	½-Ellip.
Talbot	133	56	4	L.	Int.	102x140	1.37	278	C-I.	25	H-S.	Own	Pres.	Magneto	Amid.	Cone.	4	Side.	Bev.	....	½-Ellip.
Talbot	139	56	6	L.	Int.	80x130	1.62	230	C-I.	36	H-S.	Own	Pres.	Magneto	Amid.	Cone.	4	Side.	Bev.	....	½-Ellip.
Vauxhall	130	56	4	L.	Int.	95x140	1.47	241	C-I.	25	H-S.	W. & P.	Pres.	Magneto	Amid.	Disk.	4	Side.	Sp.B.	3.6–1	½-Ellip.
Vauxhall	114	54	4	L.	Int.	98x150	1.53	275	C-I.	30	H-S.	Zenith	Pres.	Magneto	Amid.	Disk.	4	Side.	Sp.B.	3–1	½-Ellip.
Vulcan	108	48	4	I.	Det.	69x120	1.74	113	C-I.	12	Cir.	Zenith	Grav.	Magneto	Amid.	Disk.	4	Cent.	Bev.	4–1	Canti.
Vulcan	123	56	4	L.	Det.	80x130	1.62	159	C-I.	16	Cir.	Zenith	Vac.	Magneto	Amid.	Cone.	4	Side.	Bev.	4–1	½-Ellip.
Vulcan	128	56	4	L.	Int.	90x130	1.44	201	Al.	20	Cir.	Zenith	Vac.	Magneto	Amid.	Cone.	4	Cent.	W.	4–1	½-Ellip.
Wolseley	99	46	4	I.	Det.	65x95	1.46	76	Al.	10	Cir.	Zenith	Grav.	Battery	Unit-A.	Disk.	3	Side.	W.	5.4–1	¼-Ellip.
Wolseley	118	52	4	I.	Det.	80x130	1.62	159	Al.	15	Cir.	Own	Vac.	Battery	Amid.	Disk.	3	Side.	W.	4.7–1	¼-Ellip.
Wolseley	138	54	6	L.	Int.	80x130	1.62	230	Al.	20	Cir.	Own	Vac.	Magneto	Amid.	Disk.	4	Side.	W.	4.1–1	Canti.
Zephyr	114	50	4	I.	Det.	69x130	1.88	118	St.	12	Cir.	Zenith	Grav.	Magneto	Amid.	Cone.	4	Cent.	W.	....	Canti.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

Abbreviations

Column 1:
*—Lagonda also 108 in.; *—Lanchester also 150 in.; *—Sunbeam also 144 in.

Column 4:
L.—Valves at side; *I.*—Valves in head; *Sl.*—Sleeve valves.

Column 5:
Int.—Integral or fixed; *Det.*—Detachable.

Column 6:
*—Also 90x150 m.m.

Column 9:
Al.—Aluminum; *C-I.*—Cast Iron; *St.*—Steel.

Column 11:
Cir.—Circulating splash; *H-S.*—Hollow shaft (drilled crankshaft).

Column 13:
Vac. — Vacuum; *Grav.* — Gravity; *Pres.*—Pressure.

Column 15:
Amid. — Amidships; *Unit-E.* — Unit with engine;—*Unit-A.*—Unit with rear axle.

Column 19:
Bev.—Bevel; *Sp.B.*—Spiral bevel; *W.*—Worm.

Column 21:
½-Ellip. — Semi-elliptic; *Canti.* — Cantilever.

Trend and Specifications of

OUR review of the Paris automobile show, published some months ago, made it apparent that most of the new trends in design in Continental Europe are in the same direction in which automobile design has progressed in the United States during the more than four years of the World War.

Unit power plants, electric starters, helical bevel gears and other features seen for the first time at a Salon last year are not new to American engineers, because they are features which either originated here or were first popularized here. The same applies to practically all the other outstanding features of the new cars that were shown at the Salon.

It was to be expected that during the long period of six years which elapsed since the last previous Paris automobile show was held, there had been a good deal of shifting in practice, from one known form of construction to another. Our French correspondent has prepared a table of specifications of all the Continental cars exhibited at Paris, and we have analyzed this table to determine the prevalence of different practices and compared the results with similar data relating to previous Paris shows. The data is taken from 129 different car models.

It is rather remarkable that no less than 22 cars have cylinder displacements of less than 100 cu. in. For the sake of comparison it may be mentioned that the Ford has a cylinder displacement of 177 cu. in. The smallest displacement of all is 59 cu. in., which is a trifle less than that of a standard side car type motorcycle engine.

From this the piston displacements range up to 334 cu. in. in the four-cylinder class and to 502 cu. in. in the six. Naturally, the cars with engines of small piston displacements are small cars of narrow tread and short wheelbase. The narrowest vehicle has a tread of only 39 in., and vehicles of almost any tread can be had, from this minimum up to the maximum of 57 in. From the table it will be seen that, strictly speaking, there is no standard tread in Europe. About one-third of all the cars have a tread of 56 in., and more than one-quarter of the whole, either 54 or 55 in. Another favorite tread seems to be around 48 or 49 in. More than 20 per cent of all the cars have a tread of less than 50 in., and are, therefore, distinctly narrow-tread vehicles. These same machines also have a short wheelbase. The average wheelbase of all four-cylinder cars with a piston displacement of less than 100 cu. in. is 100.5 in.; the average wheelbase of all four-cylinder cars having a piston displacement of 100 to 149.9 cu. in. is 115.3 in.; the average wheelbase of cars from 150 to 199.9 cu. in. displacement is 123 in. and the average wheelbase of all cars of over 200 cu. in. displacement, 130.7 in.

Six-cylinder cars of a certain piston displacement naturally have a considerably longer wheelbase than four-cylinder

MAKE	Nationality	Wheelbase (In.)	Track (In.)	Number of Cylinders	Cylinder Shape	Cylinder Head	Bore and Stroke (Mm.)	Piston Displacement (Cu.In.)	Horsepower (Nominal)	Water Cooling	Lubricating System
Ajax	Fr.	102	43	2	L.	Int.	84x 86	58	9	Ther.	Snl.
Alba	Fr.	114	49	4	L.	Int.	65x130	105	9	Ther.	Pres.
Alda	Fr.	120	55	4	L.	Int.	90x140	212	15	Ther.	Cir.
Aries	Fr.	118	56	4	L.	Int.	80x140	171	15	Pump.	Pres.
A.S.S.	Fr.	115	56	2	*	Int.	85x110	76	12	Ther.	Cir.
Bellanger	Fr.	103	57	4	I.	Int.	90x125	193	17	Pump.	Pres.
Bellanger	Fr.	147	57	8	I.	Int.	90x125	386	50	Pump.	Pres.
Bellanger (Briscoe)	Fr.	114	56	4	L.	Det.	88x127	188	15	Ther.	Cir.
Berliet	Fr.	129	56	4	L.	Det.	90x130	201	15	Ther.	Pres.
Bianchi	It.	....	...	4	L.	Int.	65x110	89	12	Ther.	Pres.
Bianchi	It.	....	...	4	L.	Int.	75x120	129	14	Pump.	Pres.
Bianchi	It.	....	...	4	L.	Int.	95x134	231	18	Pump.	Pres.
Bignan	Fr.	112	52	4	L.	Int.	85x130	179	25	Pump.	Pres.
Bollee, Léon	Fr.	125	54	4	L.	Int.	.....	.....	12	Ther.	Pres.
Bollee, Léon	Fr.	125	54	4	L.	Int.	85x130	179	15	Ther.	Pres.
Bollee, Léon	Fr.	134	55	4	L.	Int.	95x130	224	18	Ther.	Pres.
Bollee, Léon	Fr.	128	55	6	L.	Int.	83x110	159	18	Ther.	Pres.
Brasier	Fr.	129	55	4	L.	Int.	85x150	207	18	Pump.	Pres.
Brasier	Fr.	143	56	6	L.	Int.	90x140	325	24	Pump.	Pres.
Buchet	Fr.	92	48	4			60x100	68	6	.....	Pres.
Buchet	Fr.	105	48	4			65x110	89	8	.....	Pres.
Bugatti	Fr.	95	44	4	I.	Int.	65x100	81	6	Pump.	Pres.
Charron	Fr.	90	....	4	L.	Int.	58x100	64	6	Ther.	Cir.
Charron	Fr.	132	55	4	L.	Det.	82x142	182	18	Pump.	Pres.
Chenard & Walcker	Fr.	121	55	4	L.	Int.	75x150	161	12	Ther.	Pres.
Chenard & Walcker	Fr.	131	55	4	L.	Int.	80x150	183	15	Ther.	Pres.
Chiribiri	It.	102	49	4	L.	Int.	65x120	97	12	Ther.	Cir.
Clement-Bayard	Fr.	95	45	4	L.	Int.	60x100	68	8	Ther.	Cir.
Clement-Bayard	Fr.	....	55	4		Det.	85x115	159	15	Ther.	Cir.
Corre	Fr.	102	49	4	L.	Int.	.....	....	8	Ther.	Pres.
Cottin-Desgouttes	Fr.	133	55	4	L.	Int.	80x160	196	14	Pump.	Pres.
Cottin-Desgouttes	Fr.	133	55	4	L.	Int.	90x160	247	18	Pump.	Pres.
Cottin-Desgouttes	Fr.	133	55	4	L.	Int.	100x160	305	23	Pump.	Pres.
Cottin-Desgouttes	Fr.	141	55	4	L.	Int.	120x160	440	32	Pump.	Pres.
Darracq	Fr.	120	54	4	L.	Det.	75x130	139	12	Ther.	Pres.
Darracq	Fr.	138	54	8	L.	Det.	75x130	278	20	Pump.	Pres.
DeDion-Bouton	Fr.	114	48	4	L.	Int.	70x120	112	12	Pump.	Pres.
DeDion-Bouton	Fr.	125	49	8	L.	Int.	60x100	136	14	Pump.	Pres.
DeDion-Bouton	Fr.	133	52	8	L.	Int.	70x120	240	20	Pump.	Pres.
Delage	Fr.	135	56	6	L.	Int.	80x150	274	25	Pump.	Pres.
Delahaye	Fr.	126	54	4	L.	Det.	85x130	179	18	Pump.	Cir.
Delahaye	Fr.	137	56	6	L.	Det.	85x120	248	22	Pump.	Cir.
Delaugere-Clayette	Fr.	116	56	4	L.	Int.	70x140	131	10	Pump.	Pres.
Delaugere-Clayette	Fr.	125	56	4	L.	Int.	85x140	193	14	Pump.	Pres.
Delaugere-Clayette	Fr.	138	56	6	L.	Int.	85x140	290	18	Pump.	Pres.
Delaunay-Belleville	Fr.	118	51	4	L.	Int.	85x130	179	12	Pump.	Pres.
Delaunay-Belleville	Fr.	133	53	6	L.	Int.	78x140	244	16	Pump.	Pres.
Delaunay-Belleville	Fr.	133	53	4	L.	Int.	100x140	267	18	Pump.	Pres.
Delaunay-Belleville	Fr.	138	55	6	L.	Int.	88x150	333	25	Pump.	Pres.
Delaunay-Belleville	Fr.	145	56	6	L.	Int.	103x160	486	50	Pump.	Pres.
Dewald	Fr.	129	56	8	I.	Int.	75x136	292	30	Pump.	Pres.
Diatto	It.	91	39	4	I.	Int.	60x 90	62	10	Pump.	Pres.
Diatto	It.	99	43	4	I.	Int.	68x100	88	15	Pump.	Pres.
Diatto	It.	112	55	4	L.	Int.	85x120	165	25	Pump.	Pres.
Doriot Flandrin Parant	Fr.	94	50	4	L.	Int.	70x130	122	12	Pump.	Cir.
Elizalde	Sp.	130	56	4	L.	Int.	80x150	183	16	Pump.	Pres.
Elizalde	Sp.	130	56	4	I.	Det.	85x150	207	20	Pump.	Pres.
Excelsior	Bel.	138	56	6	I.	Int.	85x130	310	21	Pump.	Pres.
Farman	Fr.	....	56	6	I.	Int.	100x140	401	40	Pump.	Pres.
Fiat	It.	103	48	4	L.	Det.	65x110	89	16	Pump.	Pres.
Fiat	It.	120	56	4	L.	Det.	75x130	139	25	Pump.	Pres.
Fiat	It.	134	56	6	L.	Det.	75x130	209	40	Pump.	Pres.
F.A.S.T	It.	128	56	4	I.	Det.	84x135	208	50	Pump.	Pres.
Gnome & Rhone	Fr.	144	56	6	I.	Int.	115x140	502	40	Pump.	Pres.
Gregoire	Fr.	125	56	4	L.	Int.	70x130	122	25	Ther.	Pres.
Hispano-Suiza	Fr.	145	56	6	I.	Int.	100x140	401	40	Pump.	Pres.
Hotchkiss	Fr.	130	56	4	L.	Int.	95x140	289	18	Pump.	Pres.
Hurtu	Fr.	107	49	4	L.	Int.	75x120	129	12	Ther.	Pres.
Hurtu	Fr.	118	51	4	L.	Int.	76x130	144	14	Ther.	Pres.
Itala	It.	120	56	4	L.	Int.	80x130	159	25	Pump.	Pres.
Itala	It.	122	56	4	*	Det.	105x150	316	35	Pump.	Pres.
La Buire	Fr.	117	52	4	L.	Int.	75x150	161	12	Pump.	Pres.
Lancia	It.	133	52	4	L.	Det.	110x130	301	35	Pump.	Pres.
Lancia	It.	143	57	12	I.	Det.	80x100	367	40	Pump.	Pres.
Lorraine-Dietrich	Fr.	....	56	6	I.	Int.	75x130	209	15	Pump.	Pres.
Lorraine-Dietrich	Fr.	....	56	6	I.	Det.	80x150	276	20	Pump.	Pres.
Lorraine-Dietrich	Fr.	....	56	6	L.	Int.	90x160	372	30	Pump.	Pres.
Lorraine-Dietrich	Fr.	....	56	12	I.	Det.	70x140	387	30	Pump.	Pres.
M-J	Fr.	114	56	4	I.	Int.	66x100	83	12	Ther.	Pres.
Majola	Fr.	91	40	4	I.	Int.	59x 90	59	12	Ther.	Pres.
Majola	Fr.	110	40	4	I.	Int.	65x105	84	20	Ther.	Pres.
Martini	Sw.	130	56	4	L.	Int.	90x150	232	18	Pump.	Pres.
Mathis	Fr.	86	42	4	L.	Int.	58x100	64	8	Ther.	Cir.
Mathis	Fr.	94	43	4	L.	Int.	60x100	68	10	Ther.	Cir.
Metallurgique	Bel.	125	52	4	L.	Int.	80x130	159	14	Ther.	Pres.
Metallurgique	Bel.	137	56	4	L.	Int.	90x140	216	18	Ther.	Pres.
Metallurgique	Bel.	148	57	4	L.	Int.	100x160	306	26	Ther.	Pres.
	1	2	3	4	5	6	7	8	9	10	11

Continental Passenger Cars

Carbureter Make	Fuel Feed	Ignition	Starting and Lighting	Clutch	Speeds	Final Drive	Tires (Mm.)	Wheels	Rear Springs	Brakes
Zenith	Grav.	Magneto	None	Cone.	2	Bev.	710x 90		Dbl. ¼-Ellip.	Tr.-R.
Zenith	Grav.	Magneto	2-Unit	Cone.	3	Bev.	760x 90	Wood*	¼-Ellip.	R.
Zenith	Vac.	Magneto	2-Unit	Cone.	4	Sp.B.	820x120	Wire	Canti.	Tr.-R.
Zenith	Vac.	Magneto	2-Unit-S.E.V.	Disk	4	Bev.	820x120	Disk	¼-Ellip.	Tr.-R.
Own	Grav.	Battery	2-Unit	Plate	2	Bev.	710x 90	Disk	Canti	R.
Zenith	Pres.	Battery	2-Unit	Disk	3	Sp.B.	810x190	Wood	Canti.	F.-Tr.-R.
Zenith	Pres.	Battery	2-Unit	Disk	3	Sp.B.	935x135	Steel	Canti.	F.-Tr.-R.
Jackson	Grav.	Battery	2-Unit-West	Disk	3	Sp.B.	820x105	Wood	¼-Ellip.	R.
Own	Vac.	Magneto	2-Unit-N.E.	Disk	3	Sp.B.	880x120	Disk	Canti.	R.
Zenith	Grav.	Magneto		Plate	4	Bev.			½-Ellip.	R.
Zenith	Pres.	Magneto		Plate	4	Bev.			½-Ellip.	R.
Zenith	Pres.	Magneto		Plate	4	Bev.			½-Ellip.	R.
Zenith	Vac.	Magneto	2-Unit-S.E.V.	Cone.	4	Bev.	880x120	Wire	¼-Ellip.	Tr.-R.
Zenith	Vac.	Magneto	2-Unit-S.E.V.	Cone.	4	Bev.	815x105	Detach.	¼-Ellip.	Tr.-R.
Zenith	Vac.	Magneto	2-Unit-S.E.V.	Cone.	4	Bev.	820x1 0	Wood	½-Ellip.	Tr.-R.
Zenith	Vac.	Magneto	2-Unit-S.E.V.	Cone.	4	Bev.	880x120	or	¼-Ellip.	Tr.-R.
Zenith	Vac.	Magneto	2-Unit-S.E.V.	Cone.	4	Bev.	880x120	Disk	¼-Ellip.	Tr.-R.
Zenith	Vac.	Magneto	2-Unit-S.E.V.	Cone.	4	Sp.B.	880x120	Wire	¼-Ellip.	Tr.-R.
Zenith	Vac.	Magneto	2-Unit-S.E.V.	Cone.	4	Sp.B.	895x135	Wire	½-Ellip.	Tr.-R.
					4		710x 90			
					4		760x 90			
Zenith	Pres.	Magneto	None	Disk	4	Bev.	710x 90	Wire	¼-Ellip.	Tr.-R.
Zenith	Grav.	Magneto	S.E.V.	Cone.	3	Bev.	710x 90	Disk	¼-Ellip.	R.
Zenith	Vac.	Magneto	2-Unit-S.E.V.	Cone.	4	Bev.	820x120	Wire	Canti.	R.
Solex	Vac.	Mag.-Dbl.	2-Unit-West	Plate	4	**	815x105	Wire or	½-Ellip.	Tr.-R.
Solex	Vac.	Mag.-Dbl.	2-Unit-West	Plate	4	**	880x120	Disk	¼-Ellip.	Tr.-R.
Zenith	Grav.	Battery	Light. only	Cone.	4	Bev.	710x 90	Disk	¼-Ellip.	R.
Solex	Grav.	Magneto	Light. only	Cone.	3	Bev.	710x 90	Wire	¼-Ellip.	R.
Solex	Vac.	Batt.-Delco	2-Unit-C.A.V.	Plate	3	Sp.B.	815x105	Wire	Transverse.	R.
Zenith	Grav.	Magneto	Light only	Cone.	4	Bev.	710x 90	Disk	¼-Ellip.	Tr.-R.
Zenith	Vac.	Magneto	2-Unit-S.E.V.	Cone.	4	Bev.	880x120	Disk	Canti.	Tr.-R.
Zenith	Vac.	Magneto	2-Unit-S.E.V.	Cone.	4	Bev.	880x120	Disk	Canti.	Tr.-R.
Zenith	Vac.	Magneto	2-Unit-S.E.V.	Cone.	4	Bev.	880x120	Disk	Canti.	Tr.-R.
Zenith	Vac.	Magneto	2-Unit-S.E.V.	Cone.	4	Bev.	880x120	Disk	Canti.	Tr.-R.
	Vac.	Batt.-Delco	2-Unit-Delco	Plate	4	Sp.B.	815x105	Disk	Canti	R.
Smith	Vac.	Batt.-Delco	2-Unit-Delco	Plate	4	Sp.B.	835x135	Disk	Canti	R.
	Grav.	Magneto	2-Unit-Own	Plate	4	Sp.B.	760x 90	Disk	¼-Ellip.	Tr.-R.
	Vac.	Magneto	2-Unit-Own	Plate	4	Sp.B.	815x105	Disk	½-Ellip.	Tr.-R.
	Vac.	Magneto	2-Unit-Own	Plate	4	Sp.B.	880x120	Disk	½-Ellip.	Tr.-R.
Zenith (2)	Vac.	Magneto	2-Unit-S.E.V.	Disk	4	Sp.B.	895x135	ire	½-Ellip.	F.-Tr.-R.
Claudel	Vac.	Magneto	2-Unit-Dynas	Cone.	4	Sp.B.	820x120	Wood	½-Ellip.	R.
Claudel	Vac.	Magneto	2-Unit-Dynas	Cone.	4	Sp.B.	880x120	Wood	¼-Ellip.	R.
Zenith	Vac.	Magneto	1-Unit-S.E.V.	Cone.	4	Bev.	815x105	Disk	¼-Ellip.	Tr.-R.
Zenith	Vac.	Magneto	1-Unit-S.E.V.	Cone.	4	Bev.	820x120	Disk	¼-Ellip.	Tr.-R.
Zenith	Vac.	Magneto	1-Unit-S.E.V.	Cone.	4	Bev.	835x135	Disk	¼-Ellip.	Tr.-R.
Own	Pres.	Magneto	2-Unit-S.E.V.	Disk	4	Bev.	815x105		Platform	Tr.-R.
Own	Pres.	Magneto	2-Unit-S.E.V.	Disk	4	Bev.	880x120	Wood	Platform	Tr.-R.
Own	Pres.	Magneto	2-Unit-S.E.V.	Disk	4	Bev.	880x120	or	Platform	Tr.-R.
Own	Pres.	Magneto	2-Unit-S.E.V.	Disk	4	Bev.	880x120	Wire	Platform	Tr.-R.
Own	Pres.	Magneto	2-Unit-S.E.V.	Disk	4	Bev.	935x135		Platform	Tr.-R.
Zenith	Vac.	Magneto	1-Unit	Cone.	4	Bev.	880x120	Disk	½-Ellip.	Tr.-R.
Zenith	Vac.	Magneto		Disk	3	Bev.	650x 65		¼-Ellip.	Tr.-R.
Zenith	Vac.	Magneto		Disk	4	Bev.	710x 90		¼-Ellip.	Tr.-R.
Zenith	Vac.	Magneto		Disk	4	Bev.	820x120		¼-Ellip.	Tr.-R.
Zenith	Vac.	Magneto	1-Unit	Cone.	4	Sp.B.	765x105	Disk	Canti.	Tr.-R.
Zenith	Pres.	Magneto	2-Unit	Cone.	4	Bev.	820x120	Disk	Canti	F.-R. (2)
Zenith	Pres.	Magneto	2-Unit	Cone.	4	Bev.	820x120	Disk	Canti	F.-R. (2)
Zenith	Pres.	Magneto	2-Unit	Disk	4	Bev.	895x135		Canti	F.-Tr.-R.
Zenith	Vac.	Mag. & Batt.	2-Unit-S.E.V.	Cone.	4	Sp.B.	880x120		Canti	Tr.-R.
Own	Grav.	Magneto	2-Unit-Own	Disk	4	Sp.B.	700x 90	Steel	½-Ellip.	Tr.-R.
Own	Pres.	Magneto	2-Unit-Own	Disk	4	Sp.B.	820x120	Steel	½-Ellip.	Tr.-R.
Own	Pres.	Magneto	2-Unit-Own	Disk	4	Sp.B.	835x135	Steel	½-Ellip.	Tr.-R.
Zenith	Pres.	Magneto	2-Unit	Disk	3	Bev.	820x120	Disk	½-Ellip.	Tr.-R.
Own	Pres.	Mag. & Batt.	2-Unit-Delco	Disk	3	Sp.B.	895x135	Steel	½-Ellip.	Tr.-R.
Zenith	Vac.	Magneto	2-Unit-S.E.V.	Cone.	4	Bev.	820x120	Wire	½-Ellip.	Tr.-R.
Own	Pres.	Batt. Delco	2-Unit-Delco	Disk	3	Sp.B.	895x135	Wire	½-Ellip.	F.-R.
Zenith	Vac.	Magneto	2-Unit-S.E.V.	Disk	4	Sp.B.	880x120	Wire	½-Ellip.	Tr.-R.
Solex	Grav.	Magneto	1-Unit	Cone.	4	Bev.	760x 90		½-Ellip.	Tr.-R.
Solex	Grav.	Magneto	1-Unit	Cone.	4	Bev.	810x 90		½-Ellip.	Tr.-R.
Own	Pres.	Magneto	2-Unit	Disk	4	Bev.	820x120		¼-Ellip.	Tr.-R.
Own	Pres.	Magneto	2-Unit	Disk	4	Bev.	895x135		½-Ellip.	Tr.-R.
Zenith	Vac.	Magneto	2-Unit	Cone.	4	Bev.	*815x105	Disk	Canti.	Tr.-R.
Zenith	Pres.	Magneto	2-Unit	Disk	4	Bev.	895x135	Disk	¼-Ellip.	Tr.-R.
Zenith	Pres.	Mag.-Dixie	2-Unit	Disk	3	Bev.	895x135	Disk	Canti.	Tr.-R.
Own	Grav.	Batt.	2-Unit-Delco	Plate	3	Sp.B.	815x105	Steel	Canti.	R.
Own	Pres.	Mag. & Batt.	2-Unit-Delco	Disk	4	Sp.B.	880x120	Steel	¼-Ellip.	Tr.-R.
Own	Pres.	Mag. & Batt.	2-Unit-Delco	Disk	4	Sp.B.	895x135	Steel	½-Ellip.	Tr.-R.
Own	Pres.	Mag. & Batt.	2-Unit-Delco	Disk	3	Sp.B.	895x135	Steel	½-Ellip.	Tr.-R.
Vici	Vac.	Magneto	1-Unit		*Fr.		760x 90	Disk	¼-Ellip.	R.
Claudel	Grav.	Magneto	Light. only	Cone.	3	Bev.	710x 90	Disk	¼-Ellip.	Tr.-R.
Claudel	Grav.	Magneto	Light. only	Cone.	3	Bev.	760x 90	Disk	¼-Ellip.	Tr.-R.
Zenith	Pres.	Magneto	2-Unit	Disk	4	Bev.	880x120	Wood	¼-Ellip.	Tr.-R.
Solex	Grav.	Magneto	2-Unit	Disk	3		710x 90	Disk	¼-Ellip.	R.
Solex	Grav.	Magneto	2-Unit	Disk	3		710x 90	Disk	½-Ellip.	R.
	Vac.	Magneto			4	Sp.B.	820x120	Disk	½-Ellip.	Tr.-R.
	Vac.	Magneto			4	Sp.B.	880x120	or	½-Ellip.	Tr.-R.
	Vac.	Magneto			4	Sp.B.	880x120	Wire	½-Ellip.	Tr.-R.
12	13	14	15	16	17	18	19	20	21	22

cars with the same size of engine. Six-cylinder cars are made in the larger sizes only. Of those having a piston displacement up to 300 cu. in., the average wheelbase is 133.4 in., and of those with a piston displacement of over 300 cu. in., the average wheelbase is 141.2 in.

As was pointed out in our review of the Salon, the six-cylinder car has "arrived," as they say in France; no less than 16.7 per cent of all models exhibited being of this type. Eight-cylinder models also were shown in an appreciable proportion, 5.7 per cent of all models being of this class. The four-cylinder type, with a representation of 74.6 per cent, remains predominant, however, while two-cylinder and twelve-cylinder models were each represented by two examples, equivalent to 1.5 per cent of the total each.

The T head cylinder has had its day in France, at least so far as passenger car engines are concerned. From a representation of 50 per cent in 1910, it had dropped to 15 per cent in 1914, and at the late show there was not a single car with an engine of this type. The L head cylinder, on the other hand, has been constantly in the ascendancy, having risen from 30 per cent in 1910 to 56 per cent in 1914, and in 1919 it was used on 83 per cent of all the poppet valve engines in use. The remaining 18 per cent were of the I head or valve-in-head type. As between poppet valve and sleeve valve engines, the proportion was 93.1 per cent of the former to 6.9 per cent of the latter.

A feature regarding which no statistics were gathered previous to the war is that of type of cylinder head, whether cast integral or made detachable. The detachable head in modern thin-walled cylinders was made possible by the copper-asbestos gasket, which originated in America, and it is very doubtful whether more than a few cars were made in France with detachable cylinder heads previous to 1914. At the late show, 22.2 per cent of the engines had removable heads, and it does not require a great deal of foresight to predict an increase in this proportion for next year.

Thermo-syphon circulation again records a slight gain. Already in 1910 it was used on 30 per cent of all of the chassis; in 1912 its representation had risen to 35 per cent, and this year it is 37.3 per cent. Rather remarkable is the heavy gain of the full pressure lubricating system. No less than 82.5 per cent of all the models shown had this oiling system, while 16.8 per cent had circulating splash and 0.7 per cent the ordinary splash in which the supply of oil in the crankcase is replenished at intervals as it is used up.

In 1910 about 35 per cent of the European cars had splash lubrication, and the percentage remained substantially the same until after the outbreak of the war. The remarkable gain of full pres-

Trend and Specifications of

sure lubrication will best be realized when it is stated that 12 years ago there were on the American market only 2 cars employing this system.

About one-half of all the 1920 models have vacuum feed of the fuel, and in this respect, therefore, Continental Europe is still some distance behind America, where this system originated. In 1913, at the last previous automobile Salon, fuel feed by the vacuum system was as yet unknown abroad. At that time 62 per cent of all the cars had gravity feed, and the remaining 38 per cent pressure feed. At the late Salon, the pressure feed representation had dropped to 26.5 per cent, and the gravity feed to 22.8 per cent. In addition to the Stewart vacuum feed system, which is being marketed in France under the trade name "Autovac," there are one or two systems of native origin.

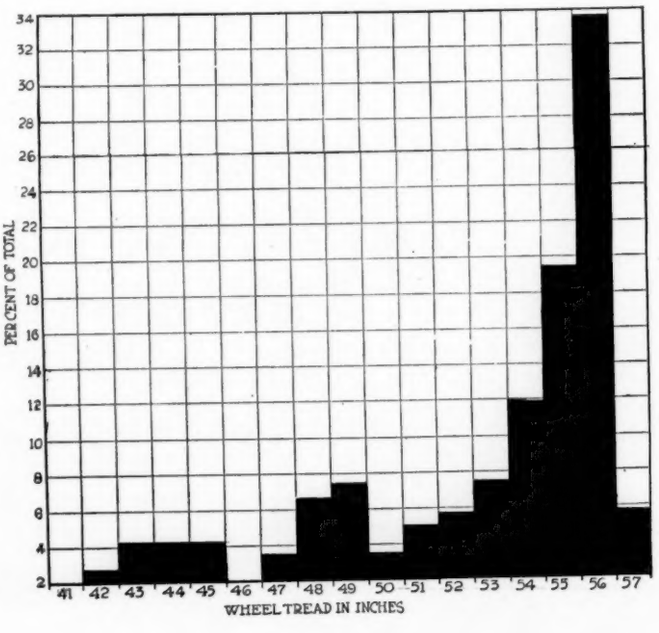
Although starting and lighting outfits are furnished as regular equipment on the great majority of the cars, most of the manufacturers continue to fit a magneto for ignition, 91.2 per cent of all the chassis being magneto-equipped. Of these 4 per cent furnish dual ignition while the rest rely on the magneto alone.

In regard to clutches, the change which we have been observing in this country for some years past is being duplicated in France, in that the cone clutch is gradually losing ground and the disk clutch is taking its place. Whereas in 1910 cone clutches were used on 64 per cent of all the models, which percentage had dropped to 55 in 1913, this type of clutch is now found on only 42.5 per cent of the models. The disk clutch is almost up to the cone clutch in popularity, being found on 41.7 per cent of the chassis. In addition there are plate clutches on 15.1 per cent, and one car still employs a band clutch. It is sometimes rather difficult to distinguish between a plate clutch and a disk clutch, but the former type comprises all those having only a single driven disk clamped between two driving disks. Consequently there are two surfaces at which slipping occurs when the clutch is engaged or disengaged.

It may occasion some surprise to learn how tight a hold the four-speed gear still has on Continental manufacturers. No less than 81.2 per cent of all of the cars carry a four-speed gearset. This may partly be accounted for by the fact that French manufacturers have been constantly reducing the piston displacement of their engines, and with a rather small engine, a four-speed gear, of course, has the advantage over a three-speed, in that it allows of operating the engine more nearly at its most economical speed. Practically all of the remaining cars have a three-speed gear, only two being equipped with a two-speed transmission, and one having a friction drive.

There has also been a very notable change in regard to final drives since the last show previous to the war. At that

MAKE	Nationality	Wheelbase (In.)	Track (In.)	Number of Cylinders	Cylinder Shape	Cylinder Head	Bore and Stroke (Mm.)	Piston Displacement (Cu.In.)	Horsepower (Nominal)	Water Cooling	Lubricating System
Miesse	Bel.	122	53	4	I.	Det.	69x130	118	15	Pump.	Pres.
Miesse	Bel.	133	53	8	I.	Det.	69x130	237	30	Pump.	Pres.
Minerva	Bel.	137	56	4	Sl.	Det.	90x140	216	20	Pump.	Pres.
Minerva	Bel.	145	56	6	Sl.	Det.	90x140	324	30	Pump.	Pres.
Mors	Fr.	125	54	4	Sl.	Det.	90x130	201	15	Pump.	Cir.
Motobloc	Fr.	....	...	4	*	Int.	80x120	147	12	Pump.	Pres.
Motobloc	Fr.	....	...	4	*	Int.	80x148	181	15	Pump.	Pres.
Nagant	Bel.	131	54	4	L.	Int.	80x150	183	16	Pump.	Cir.
Nagant	Bel.	137	55	4	L.	Int.	95x160	276	25	Pump.	Cir.
Panhard Levassor	Fr.	....	56	4	L.	Int.	72x140	138	12	Pump.	Cir.
Panhard Levassor	Fr.	....	...	4	Sl.	Det.	85x140	193	16	Pump.	Cir.
Panhard Levassor	Fr.	....	...	4	Sl.	Det.	105x140	295	20	Pump.	Cir.
Paquis	Fr.	100	50	4	L.	Int.	65x120	97	10	Ther.	Pres.
Peugeot	Fr.	99	47	4	L.	Int.	66x105	88	10	Ther.	Cir.
Peugeot	Fr.	120	54	4	L.	Int.	82x130	167	14	Pump.	Pres.
Peugeot	Fr.	137	56	6	Sl.	Det.	95x140	362	25	Pump.	Pres.
Philos	Fr.	105	49	4	L.	Int.	60x100	68	6	Ther.	Pres.
Philos	Fr.	105	49	4	L.	Int.	65x120	97	8	Ther.	Pres.
Picard-Pictet	Sw.	150	57	4	Sl.	Det.	85x130	179	16	.....	*
Picard-Pictet	Sw.	126	56	8	Sl.	Det.	85x130	358	32	Pump.	Pres.
Renault	Fr.	103	56	4	L.	Int.	75x120	129	10	Ther.	Cir.
Renault	Fr.	120	56	4	L.	Int.	80x140	171	12	Ther.	Cir.
Renault	Fr.	130	56	4	L.	Int.	95x160	276	18	Ther.	Cir.
Renault	Fr.	....	56	6	L.	Int.	100x160	458	40	Ther.	Cir.
Rochet-Schneider	Fr.	....	...	4	L.	Int.	80x130	159	12	Ther.	Pres.
Rochet-Schneider	Fr.	....	...	4	L.	Int.	95x140	289	18	Ther.	Pres.
Rochet-Schneider	Fr.	....	...	6	L.	Int.	100x130	372	30	Pump.	Pres.
Rolland-Pilain	Fr.	110	51	4	L.	Int.	70x125	98	10	Ther.	Pres.
Rolland-Pilain	Fr.	125	54	6	L.	Int.	66x115	143	12	Ther.	Pres.
Rolland-Pilain	Fr.	128	54	4	L.	Int.	95x140	289	18	Ther.	Pres.
Roy	Fr.	128	53	4	L.	Int.	85x130	179	14	Pump.	Pres.
S.C.A.P.	Fr.	110	51	4	L.	Int.	76x130	144	14	Ther.	Pres.
Schneider	Fr.	125	55	4	L.	Int.	87x140	202	14	Pump.	Pres.
Schneider	Fr.	130	55	4	L.	Int.	96x190	334	26	Pump.	Pres.
Schneider	Fr.	136	55	6	L.	Det.	92x140	339	30	Pump.	Pres.
Secqueville & Hoyau	Fr.	114	54	4	L.	Int.	60x110	75	4	Ther.	Pres.
Sigma	Fr.	113	45	4	L.	Int.	65x120	97	10	Ther.	Pres.
Sizaire-Berwick	Fr.	135	55	4	L.	Int.	95x160	276	25	Pump.	Pres.
Sizaire & Naudin	Fr.	130	54	4	L.	Int.	75x130	139	12	Ther.	Pres.
S.P.A.	It.	118	55	4	L.	Int.	85x120	165	20	Pump.	Pres.
S.P.A.	It.	122	55	4	L.	Int.	100x140	267	30	Pump.	Pres.
S.P.A.	It.	137	55	6	I.	Int.	85x130	269	40	.....	Pres.
Spyker	Du.	130	56	4	L.	Int.	90x140	216	30	Ther.	Pres.
Suere	Fr.	94	47	8	L.	Det.	45x 90	69	10	Ther.	Pres.
Turcat-Mery	Fr.	129	56	4	L.	Int.	80x150	183	25	Pump.	Pres.
Unic	Fr.	125	54	4	L.	Int.	80x130	159	13	Pump.	Pres.
Vermorel	Fr.	122	55	4	L.	Int.	74x130	136	12	Pump.	Pres.
Vinot-Deguingand	Fr.	117	53	4	L.	Int.	80x130	159	14	Pump.	Pres.
Voisin	Fr.	....	56	4	Sl.	Det.	95x140	241	20	Pump.	Pres.
Zebre	Fr.	99	44	4	L.	Int.	55x105	61	8	Ther.	Pres.
Zedel	Fr.	117	48	4	L.	Int.	82x130	167	13	Pump.	Pres.
	1	2	3	4	5	6	7	8	9	10	11



Abbreviations

Column 1:

Fr. — French; *It.* — Italian; *Bel.*—Belgian; *Du.*—Dutch; *Sp.* — Spanish; *Sw.*—Swiss.

Column 5:

L.—Valves at side; *I.*—Valves in head; *Sl.*—Sleeve valves; **A.S.S.*—has 2-stroke engine; **Itala*—has rotary valves; **Motobloc*—has super-imposed valves.

Column 6:

Int — **Integral or fixed**; *Det.*—Detachable.

Column 10:

Ther.—Thermo-siphon.

Column 11:

Cir.—Circulating splash; *Pres.*—Pressure; *—Dry sump; *Spl.*—Splash.

Continental Passenger Cars

Carbureter Make	Fuel Feed	Ignition	Starting and Lighting	Clutch	Speeds	Final Drive	Tires (Min.)	Wheels	Rear Springs	Brakes
Zenith	Vac.	Magneto	2-Unit	Disk	4	Sp.B.	815x105		½-Ellip.	R.
Zenith	Vac.	Magneto	2-Unit	Disk	4	Sp.B.	880x120		½-Ellip.	R.
Zenith	Vac.	Magneto	2-Unit-S.E.V.	Disk	4	Sp.B.	880x120	Wire	Canti.	Tr.-R.
Zenith	Vac.	Magneto	2-Unit-S.E.V.	Disk	4	Sp.B.	880x120	Wire	Canti.	Tr.-R.
Zenith	Vac.	Magneto	2-Unit-S.E.V.	Band	4	*	820x120	Disk	½-Ellip.	Tr.-R.
Zenith	Vac.	Magneto		Disk	4	Bev.	815x105	Disk	¾-Ellip.	Tr.-R.
Zenith	Vac.	Magneto		Disk	4	Bev.	820x120	Disk	¼-Ellip.	Tr.-R.
Zenith										
Zenith	Vac.	Magneto	2-Unit-S.E.V.	Disk	4	Bev.	880x120	Disk	½-Ellip.	Tr.-R.
Zenith	Vac.	Magneto	2-Unit-S.E.V.	Disk	4	Bev.	895x135	Disk	½-Ellip.	
Zenith								Wood	½-Ellip.	R.
Own.	Grav.	Magneto	2-Unit-S.E.V.	Plate	4	Sp.B.		Wood*	½-Ellip.	R.
Own.	Pres.	Magneto	2-Unit-S.E.V.	Plate	4	Sp.B.		Wire	½-Ellip.	R.
Own.	Pres.	Magneto	Light. only	Cone	4	Bev.	760x 90	Disk	½-Ellip.	R.
Zenith	Grav.	Magneto	1-Unit-S.E.V.	Disk	4	W	710x 90	Wood	Canti.	R.
Zenith	Grav.	Magneto	S.E.V.	Disk	4	W	820x120	Wire		Tr.-R.
Zenith	Vac.	Magneto	2-Unit-S.E.V.	Disk	4	Bev.	880x120	Wood	½-Ellip.	R.
Zenith	Vac.	Magneto	2-Unit-S.E.V.	Disk	3	Bev.	710x 90	Disk	½-Ellip.	R.
Zenith	Grav.	Magneto	2-Unit-S.E.V.	Disk	3	Bev.	760x 90	Disk	½-Ellip.	R.
Zenith	Grav.	Magneto	2-Unit-S.E.V.	Disk	4	Sp.B.	880x120	Disk or Wire	½-Ellip.	F.-Tr.-R.
Zenith	Vac.	Magneto	2-Unit-West	Disk	4	Sp.B.	880x120		½-Ellip.	F.-Tr.-R.
Zenith	Vac.	Magneto	2-Unit-West	Disk	4	Sp.B.				
Zenith										
Own.	Grav.	Magneto	2-Unit-S.E.V.	Cone	3	Sp.B.	760x 90	Wood*	Transverse	R.
Own.	Grav.	Magneto	2-Unit-S.E.V.	Cone	4	Sp.B.	815x105	Wood*	½-Ellip.	Tr.-R.
Own.	Grav.	Magneto	2-Unit-S.E.V.	Cone	4	Sp.B.	820x120	Wood*	½-Ellip.	Tr.-R.
Own.	Pres.	Magneto	2-Unit-S.E.V.	Cone	4	Sp.B.	920x120	Wood*	½-Ellip.	Tr.-R.
Own.	Pres.	Magneto	2-Unit-S.E.V.	Cone	4	Sp.B.	820x120	Disk	Canti.	Tr.-R.
Zenith	Pres.	Magneto	2-Unit-S.E.V.	Cone	4	Sp.B.	880x120	Disk	Canti.	Tr.-R.
Zenith	Pres.	Magneto	2-Unit-S.E.V.	Cone	4	Sp.B.	880x120	Disk	Canti.	Tr.-R.
Zenith	Vac.	Magneto	2-Unit-S.E.V.	Cone	4	Bev.	765x105	Disk	½-Ellip.	Tr.-R.
Zenith	Grav.	Magneto	2-Unit-S.E.V.	Cone	4	Bev.	815x105	Disk	½-Ellip.	Tr.-R.
Zenith	Vac.	Magneto	2-Unit-S.E.V.	Cone	4	Bev.	880x120	Disk	½-Ellip.	Tr.-R.
Zenith	Vac.	Magneto	2-Unit-S.E.V.	Cone	4	Bev.	815x105		½-Ellip.	Tr.-R.
Zenith	Vac.	Magneto	2-Unit-S.E.V.	Cone	4	B v.	815x105		½-Ellip.	Tr.-R.
Zenith	Vac.	Magneto	1-Unit-S.E.V.	Cone	4	Sp.B.	875x105	Steel	½-Ellip.	Tr.-R.
Zenith	Vac.	Magneto	1-Unit-S.E.V.	Cone	4	Sp.B.	880x120	Steel	½-Ellip.	Tr.-R.
Zenith	Vac.	Magneto	1-Unit-S.E.V.	Plate	4	Sp.B.	880x120	Steel	Canti.	Tr.-R.
Zenith	Vac.	Magneto	2-Unit-S.E.V.	Plate	4	Sp.B.	710x 90	Wr. or Disk	½-Ellip.	R.
Claudel	Vac.	Magneto		Disk	4	Bev.	760x 90	Disk	½-Ellip.	Tr.-R.
Zenith	Grav.	Magneto	2-Unit-West	Disk	4	*	895x135	Wire	½-Ellip.	Tr.-R.
	Pres.	Magneto	2-Unit-S.E.V.	Cone	4	Bev.	815x105	Disk	½-Ellip.	Tr.-R.
Zenith	Grav.	Magneto	2-Unit	Disk	4	Bev.	810x120	Steel	½-Ellip.	Tr.-R.
Own.	Pres.	Magneto	2-Unit	Disk	4	Bev.	820x120	Steel	½-Ellip.	Tr.-R.
Own.	Pres.	Magneto	2-Unit	Disk	4	Bev.	820x120	Steel	Canti.	Tr.-R.
Own.	Pres.	Magneto	2-Unit	Disk	4	Bev.	820x120	Steel	Canti.	R.
Stromberg	Vac.	Mag. & Delco	2-Unit-Delco	Disk	4	Sp.B.	835x135	Steel	½-Ellip.	Tr.-R.
Zenith	Grav.	Batt.-Delco	2-Unit-Delco	Cone	3	Bev.	710x 90	Disk	½-Ellip.	
Zenith	Grav.		2-Unit-Delco	Cone	4	Sp.B.	820x120	Steel	½-Ellip.	Tr.-R.
Zenith	Grav.		2-Unit-Delco	Cone	4	Sp.B.	820x120	Steel	Canti.	Tr.-R.
Own.	Vac.	Magneto	2-Unit-S.E.V.	Cone	4	Bev.	765x105	Steel	Canti.	Tr.-R.
Zenith	Vac.	Magneto	1-Unit-P.Rhone	Cone	4	Bev.	820x120	Disk	½-Ellip.	Tr.-R.
Zenith	Vac.	Magneto	2-Unit-S.E.V.	Plate	4	*	895x135	Wire	Canti.	R.
Zenith	Vac.	Magneto								
Zenith	Grav.	Magneto	2-Unit	Plate	4	Bev.	710x 90	Wire	Canti.	Tr.-R.
Zenith	Vac.	Magneto	2-Unit	Disk	4	Bev.	820x120	Steel	½-Ellip.	Tr.-R.
	12	13	14	15	16	17	18	19	20	21	22

Abbreviations

Column 13:

Vac.—Vacuum; *Grav.*—Gravity; *Pres.*—Pressure.

Column 17:

**Fr.*—*Friction.*

Column 18:

Bev.—Bevel; *Sp. B.*—Spiral bevel; *—Herringbone; **—Double reduction; *W.*—Worm.

Column 19—

*—820x120 rear.

Column 20:

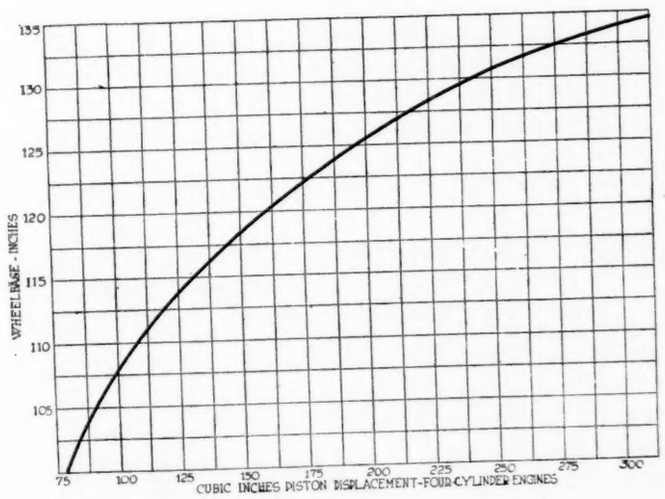
* — Detachable. (Wire, disk and steel are detachable).

Column 21:

½-Ellip. — Semi-elliptic; *Canti.* — Cantilever.

Column 22:

Tr.—Transmission; *R.*—Rear; *F.*—Front.



time, in 1913, the spiral bevel gear was an unknown quantity in France. More than 90 per cent of the cars at that time had a straight bevel gear final drive, there were a few still left with chain drives, and the rest had a herringbone gear drive. Now the spiral bevel gear drive is found on 42.2 per cent of all the cars, while 56.3 per cent use straight bevel gears. Another year, no doubt, will see another great accretion to the ranks of those using the spiral bevel gear, as its advantages cannot fail to impress the manufacturers.

There has been a great change in the situation with regard to wheels, from the time of the last pre-war show. The wooden wheel has practically disappeared as a factor in the passenger car field, being furnished as standard equipment only on 5 per cent of all 1920 models. The wire wheel, which previous to the war was the chief competitor of the wood wheel, now has a representation of 16 per cent. The disk wheel, a product of the war, is already represented on 41.2 per cent of all the chassis. In addition to disk wheels, there is used to a considerable extent in Europe a type of wheel made of steel tubing or sheet steel, which has substantially the same outward appearance as the wood wheel, and this type, referred to as steel wheels, is furnished as standard equipment on 23.5 per cent of the chassis. A good many foreign manufacturers offer their customers an option with regard to wheels.

Two types of rear springs practically monopolize the field, the half elliptic and the cantilever. Of these, the former is found on 65.1 per cent of the chassis, the latter on 23.7 per cent. The three-quarter elliptic, once so popular, has practically passed out of use.

Continental Practice—in Percentages

Cylinder Number

Four-cylinder	74.6
Six-cylinder	16.7
Eight-cylinder	5.7
Two-cylinder	1.5
Twelve-cylinder	1.5

Cylinder Types

L-head	76.3
I-head	16.8
Sleeve valve	6.9

Cylinder Heads

Integral	77.8
Detachable	22.2

Water Cooling

Pump	62.7
Thermo-siphon	37.3

Lubrication

Pressure feed	82.5
Circulating splash	16.8
Plain splash	0.7

Fuel Feed

Vacuum	50.7
Pressure	26.5
Gravity	22.8

Ignition

Magneto alone	87.2
Battery alone	8.8
Magneto and battery	4

Clutches

Cone	42.5
Disc	41.7
Plate	15.1
Band	0.7

Gearsets

Four-speed	81.2
Three-speed	16.7
Two-speed	1.4
Friction	0.7

Final Drive

Straight bevel	56.3
Spiral bevel	42.2
Worm	1.5

Road Wheels

Steel disk	41.2
Steel spoked	23.5
Wire spoked	16
Optional	14.3
Wood	5

Rear Springs

Half elliptic	65.1
Cantilever	22.7
Quarter elliptic	4.5
Platform	3.7
Three-quarter ell	1.5
Transverse	1.5

Brake Location

Transmission and rear	68.1
Rear only	25.2
Front, rear and tran.	4.5
Front and rear	2.2

Exports of Passenger Automobiles for

(*Figures are for Fiscal*

	1907	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	Total by Countries
Europe:													
	8	*22*	*25*	*36*	*100*	*134*	*314*	*4*	.....	.....	.....	.....	*647*
Austria-Hungary	$16,611	$36,978	$26,178	$27,911	$78,748	$91,781	$190,199	$2,310	.....	.....	.....	.....	$473,934
	.....	.....	*2*	*1*	*13*	*16*	*20*	*18*	*6*	*1*	.....	.....	*77*
Azores & Madeira Islands	.....	.....	$2,006	$1,265	$7,866	$10,549	$10,771	$10,119	$2,272	$700	.....	.....	$45,548
	35	*14*	*58*	*133*	*122*	*94*	*244*	*12*	.....	.....	.....	*281*	*1,007*
Belgium	$58,859	$46,340	$147,375	$241,269	$140,585	$85,679	$139,681	$15,191	.....	.....	.....	$322,168	$1,234,407
	.....	.....	*2*	*9*	*28*	*17*	*43*	.....	.....	.....	.....	.....	*99*
Bulgaria	.....	.....	$1,890	$6,530	$19,716	$11,457	$21,679	.....	.....	.....	.....	.....	$61,272
	40	*50*	*46*	*52*	*51*	*81*	*263*	*219*	*806*	*1,215*	*2*	*1,089*	*3,904*
Denmark	$30,464	$29,967	$46,024	$40,021	$41,976	$77,149	$176,947	$156,296	$548,971	$932,768	$4,100	$2,118,679	$4,212,407
	.....	.....	.....	*14*	*24*	*51*	*106*	*17*	.....	.....	.....	*6*	*218*
Finland	.....	.....	.....	$12,049	$26,203	$53,568	$83,835	$9,163	.....	.....	.....	$7,380	$193,098
	111	*201*	*246*	*310*	*574*	*818*	*1,427*	*451*	*2,087*	*1,367*	*1,169*	*866*	*9,818*
France	$489,047	$643,692	$771,869	$473,122	$469,721	$615,086	$919,060	$252,909	$1,428,325	$836,557	$1,518,858	$1,629,332	$10,716,983
	66	*45*	*100*	*99*	*288*	*845*	*1,411*	*16*	.....	.....	.....	.....	*2,938*
Germany	$141,371	$136,966	$265,218	$209,663	$226,227	$764,389	$1,040,787	$17,364	.....	.....	.....	.....	$2,973,278
	1	*1*	.....	*2*	*1*	*7*	*64*	*9*	*15*	*9*	.....	*12*	*121*
Gibraltar	$2,500	$683	.....	$9,530	$1,673	$6,576	$33,030	$6,077	$16,165	$11,518	.....	$17,718	$105,470
	.....	.....	.....	*6*	*14*	*6*	*25*	*36*	*124*	*78*	*4*	*126*	*416*
Greece	.....	.....	.....	$3,871	$9,355	$4,080	$28,256	$28,431	$118,398	$79,913	$6,580	$181,804	$360,688
	.....	.....	.....	.....	.....	*2*	*5*	*3*	.....	*11*	*15*	*52*	*88*
Iceland and Faroe Islands	.....	.....	.....	.....	.....	$1,016	$2,488	$2,128	.....	$5,134	$11,396	$181,804	$65,374
	93	*62*	*93*	*136*	*211*	*331*	*342*	*114*	*382*	*186*	*129*	*25*	*2,177*
Italy	$249,192	$240,516	$333,193	$188,405	$193,037	$280,961	$241,466	$70,265	$217,240	$126,432	$78,228	$40,000	$2,502,679
	.....	.....	.....	.....	*1*	.....	*1*	.....	.....	.....	.....	.....	*2*
Malta, Gozo & Cyprus Is.	.....	.....	.....	.....	$500	.....	$422	.....	.....	.....	.....	.....	$922
	19	*21*	*33*	*20*	*103*	*111*	*141*	*96*	*439*	*485*	.....	*404*	*1,891*
Netherlands	$49,146	$53,965	$76,957	$50,796	$78,363	$94,163	$117,131	$131,801	$399,017	$612,495	.....	$678,891	$2,386,424
	1	*11*	*22*	*13*	*78*	*78*	*145*	*125*	*732*	*992*	*97*	*600*	*2,827*
Norway	$330	$8,079	$20,669	$13,808	$66,897	$66,689	$118,338	$89,357	$592,560	$944,002	$115,810	$827,654	$2,869,944
	.....	*4*	*9*	*23*	*15*	*73*	*59*	*14*	*204*	*283*	*223*	*87*	*955*
Portugal	.....	$3,041	$11,429	$23,966	$14,752	$58,931	$65,545	$18,255	$198,975	$271,421	$270,987	$120,045	$1,058,573
	.....	.....	.....	*46*	*31*	*38*	*28*	.....	*2*	.....	.....	*170*	*318*
Roumania	.....	.....	.....	$31,806	$22,543	$30,337	$17,018	.....	$3,000	.....	.....	$93,786	$202,711
	32	*71*	*97*	*147*	*261*	*580*	*926*	*907*	*1,268*	*780*	*492*	*6*	*5,595*
Russia in Europe	$27,638	$78,409	$107,310	$139,487	$254,047	$484,913	$898,458	$1,527,768	$3,142,616	$943,003	$1,136,400	$6,605	$8,783,897
	.....	.....	.....	*1*	*4*	*2*	*4*	*2*	*3*	.....	.....	.....	*16*
Serbia, Montenegro & Albania	.....	.....	.....	$652	$2,520	$1,160	$2,843	$2,950	$4,200	.....	.....	.....	$14,325
	10	*9*	*12*	*63*	*174*	*186*	*83*	*71*	*364*	*1,125*	*1,205*	*1,146*	*4,453*
Spain	$10,640	$9,061	$18,330	$54,599	$116,202	$127,621	$64,758	$59,555	$299,367	$1,195,887	$1,346,826	$1,161,368	$4,468,069
	53	*18*	*45*	*68*	*169*	*256*	*324*	*137*	*238*	*390*	*95*	*395*	*2,204*
Sweden	$63,051	$44,585	$55,118	$62,005	$127,729	$235,918	$253,588	$108,652	$180,869	$360,554	$111,377	$477,068	$2,090,923
	1	*5*	.....	*8*	*12*	*22*	*79*	*2*	*6*	*9*	*3*	*23*	*171*
Switzerland	$750	$5,792	.....	$5,104	$7,873	$24,965	$56,838	$1,244	$4,499	$9,248	$1,533	$30,326	$148,780
	1	.....	.....	*11*	*22*	*13*	*35*	.....	.....	.....	.....	*42*	*125*
Turkey in Europe	$2,000	.....	.....	$8,929	$13,886	$9,814	$21,052	.....	.....	.....	.....	$36,328	$92,816
		590	*1,258*	*2,222*	*5,680*	*3,783*	*6,992*	*8,321*	*9,810*	*1,268*	*742*	*743*	*41,389*
England		$1,673,914	$2,391,984	$2,233,734	$4,403,361	$2,893,785	$5,615,487	$6,849,145	$6,933,806	$1,444,346	$1,712,672	$935,969	$37,088,203
	739	*3*	*12*	*13*	*22*	*6*	*25*	*143*	*158*	*4*	*150*	*1*	*537*
Scotland	$1,414,056	$6,240	$18,109	$22,638	$28,901	$8,104	$46,948	$82,708	$124,138	$2,991	$217,000	$1,634	$559,411
		.....	*1*	*14*	*34*	*6*	*2*	*159*	*60*	.....	.....	*93*	*1,865*
Ireland		.....	$5,500	$16,850	$22,186	$5,538	$1,593	$157,091	$55,014	.....	.....	$102,059	$3,401,403
North America:													
													1
Bermuda	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	$1,800
	3	.....	.....	*1*	.....	*1*	*4*	*1*	.....	*12*	*8*	*21*	*51*
British Honduras	$4,020	.....	.....	$2,500	.....	$1,800	$3,929	$550	.....	$5,774	$6,858	$14,377	$39,808
	611	*1,230*	*3,102*	*4,687*	*6,288*	*6,723*	*4,377*	*4,127*	*10,017*	*14,421*	*12,985*	*6,131*	*75,084*
Canada	$969,385	$1,457,129	$3,340,326	$5,047,927	$7,560,655	$8,229,324	$5,445,052	$3,723,125	$6,555,334	$11,143,740	$10,189,865	$5,758,609	$70,120,975
Central American States:													
	.....	*5*	*2*	*12*	*13*	*13*	*20*	*9*	*60*	*37*	*199*	*9*	*381*
Costa Rica	.....	$3,115	$1,823	$12,698	$12,603	$14,955	$17,877	$3,897	$28,325	$23,125	$85,070	$6,126	$210,940
	4	*11*	*16*	*28*	*19*	*10*	*26*	*10*	*24*	*35*	*34*	*34*	*257*
Guatemala	$2,743	$11,597	$22,094	$34,054	$38,109	$14,892	$36,763	$12,012	$23,552	$36,174	$46,657	$39,776	$329,973
	.....	*2*	.....	.....	*3*	*4*	*4*	*51*	*34*	*42*	*16*	*10*	*146*
Honduras	.....	$492	.....	.....	$7,114	$8,100	$3,286	$20,422	$22,652	$24,564	$12,292	$13,299	$112,221
	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	*49*	*64*	*116*
Nicaragua	$2,050	.....	.....	.....	.....	.....	.....	.....	.....	.....	$32,031	$56,198	$90,279
	2	*2*	*13*	*21*	*20*	*39*	*58*	*110*	*228*	*356*	*129*	*68*	*1,053*
Panama	$1,170	$850	$13,289	$27,415	$14,271	$43,432	$51,906	$85,990	$170,964	$216,711	$93,329	$58,590	$782,843
	.....	*2*	*3*	*5*	*6*	*11*	*10*	*16*	*68*	*75*	*54*	*76*	*251*
Salvador	.....	$1,410	$5,565	$22,199	$10,658	$13,212	$13,323	$8,888	$54,598	$62,314	$68,297	$98,690	$360,854
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Greenland	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	465	*200*	*245*	*350*	*273*	*235*	*155*	*70*	*388*	*2,807*	*2,578*	*2,168*	*10,173*
Mexico	$681,086	$282,462	$459,077	$614,160	$418,599	$423,123	$239,166	$66,830	$309,200	$1,642,011	$1,653,545	$1,960,613	$9,104,210
	3	*6*	*15*	*10*	*14*	*9*	*5*	*17*	*21*	*48*	*27*	*119*	*136*
Newfoundland and Labrador	$9,828	$4,907	$18,285	$10,412	$13,812	$10,353	$2,761	$11,681	$15,632	$38,910	$34,676	$131,516	$309,273
West Indies, British:													
				22	*16*	*7*	*14*	*19*	*63*	*121*	*58*	*30*	*350*
Barbados				$22,531	$11,310	$5,973	$12,320	$8,699	$30,688	$62,364	$33,198	$25,038	$112,143
				58	*53*	*62*	*66*	*80*	*273*	*335*	*236*	*79*	*2,242*
Jamaica				$81,368	$52,659	$59,131	$61,475	$61,622	$205,239	$202,375	$149,673	$72,319	$945,861
	35	*42*	*102*	*7*	*31*	*43*	*47*	*59*	*128*	*204*	*161*	*85*	*765*
Trinidad & Tobago	$56,059	$77,164	$157,459	$7,325	$31,343	$39,902	$49,079	$40,281	$87,167	$112,014	$100,571	$66,630	$524,322
				4	*4*	*7*	*15*	*38*	*100*	*124*	*80*	*41*	*618*
Other British				$5,900	$1,960	$6,716	$11,061	$18,463	$51,612	$80,879	$50,009	$25,808	$588,956
	67	*74*	*120*	*157*	*202*	*223*	*297*	*1,359*	*3,698*	*3,529*	*2,846*	*1,862*	*14,539*
Cuba	$129,226	$140,160	$187,392	$208,960	$234,569	$242,686	$254,428	$745,695	$2,091,295	$2,545,071	$3,029,813	$2,727,216	$12,693,852
	.....	.....	.....	*1*	*5*	*4*	*3*	*3*	*9*	*18*	*152*	*26*	*221*
Danish (Virgin Is. of U.S.)	.....	.....	.....	$723	$3,303	$2,131	$2,954	$1,375	$3,426	$9,114	$12,313	$19,466	$54,805
	1	*2*	*1*	*22*	*13*	*7*	*11*	*28*	*131*	*191*	*248*	*169*	*825*
Dominican Republic	$1,650	$2,820	$4,000	$18,591	$12,739	$5,382	$15,195	$14,609	$60,127	$96,173	$157,607	$149,918	$540,811
	.....	.....	.....	*2*	*3*	*19*	*13*	*24*	*21*	*32*	*12*	*50*	*136*
Dutch	.....	.....	.....	$1,576	$1,647	$14,590	$9,605	$16,829	$10,945	$19,191	$7,435	$5,965	$86,783
	.....	*1*	.....	.....	.....	*5*	*65*	*54*	*101*	*293*	*248*	*96*	*863*
French	.....	$1,000	.....	.....	.....	$3,877	$48,377	$34,906	$63,670	$154,990	$146,698	$89,411	$542,929
	.....	.....	*1*	.....	*2*	*38*	*2*	.....	*10*	*29*	*102*	*154*	*338*
Haiti	.....	.....	$1,510	.....	$910	$24,499	$1,485	.....	$3,788	$13,780	$54,613	$134,422	$235,007

the Fiscal Years 1907 to 1919 Inclusive

Year ending June 30)

	1907	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	Total all years incl. 1908
South America:													
Argentina	39 $58,070	109 $81,614	268 $174,677	343 $423,193	727 $860,350	1,062 $1,181,735	940 $963,586	626 $294,129	4,399 $2,065,439	3,924 $2,336,001	3,585 $2,666,898	1,634 $2,094,325	17,666 $13,262,413
Bolivia	2 $1,550	.....	.....	.....	.....	2 $1,493	4 $12,764	10 $5,462	26 $16,208	141 $100,151	152 $105,408	5 $9,979	342 $253,015
Brazil	52 $57,037	24 $26,892	64 $67,687	181 $225,083	554 $662,883	987 $1,035,247	999 $264,992	81 $52,939	272 $157,968	873 $523,383	1,575 $1,000,011	443 $425,289	5,460 $4,576,774
Chile	44 $52,905	2 $1,471	3 $1,824	16 $15,231	80 $39,873	78 $109,982	195 $160,194	120 $64,327	826 $530,211	2,587 $1,821,842	3,399 $3,576,511	1,057 $1,606,758	8,372 $8,001,174
Colombia	.....	1 $1,976	12 $22,482	14 $13,579	42 $35,386	110 $113,334	79 $69,620	39 $34,956	91 $58,525	173 $118,937	164 $121,422	104 $109,174	830 $699,891
Ecuador	.....	.....	2 $2,168	4 $3,595	21 $20,578	74 $55,372	21 $21,229	20 $11,233	62 $44,396	137 $106,478	142 $130,086	53 $73,501	540 $381,086
Falkland Islands	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Guiana, British	.....	1 $823	4 $5,952	6 $4,700	20 $17,306	18 $114,313	16 $11,364	45 $24,311	73 $33,933	146 $65,989	180 $100,546	39 $38,571	549 $318,573
Dutch	.....	.....	.....	.....	.....	.....	7 $3,948	9 $4,492	15 $7,181	23 $11,797	16 $17,775	5 $2,712	75 $47,905
French	.....	.....	.....	.....	1 $580	1 $558	.....	.....	1 $1,000	1 $498	8 $3,632	1 $318	13 $6,586
Paraguay	5 $2,394	.....	1 $1,200	.....	.....	.....	.....	5 $2,308	6 $2,256	40 $20,192	13 $5,025	.....	71 $33,932
Peru	8 $6,428	2 $4,403	4 $5,004	4 $2,950	13 $10,833	70 $55,646	36 $31,362	24 $20,658	59 $40,388	400 $295,558	784 $913,699	499 $782,085	1,911 $2,175,774
Uruguay	1 $625	4 $5,657	20 $23,666	96 $147,142	177 $235,097	209 $273,253	183 $167,269	45 $25,706	285 $150,540	1,165 $612,838	2,232 $1,177,463	1,487 $1,295,120	5,912 $4,127,518
Venezuela	1 $1,000	.....	.....	.....	26 $28,180	104 $109,499	126 $102,073	227 $143,086	518 $314,156	542 $327,507	160 $97,485	190 $193,529	1,814 $1,316,515
Asia:													
Aden	.....	.....	.....	1 $788	.....	15 $7,998	28 $20,990	9 $6,706	16 $9,166	10 $7,968	8 $6,879	10 $9,791	97 $70,286
China	16 $15,255	4 $3,369	8 $13,785	42 $40,261	78 $98,730	89 $90,459	114 $143,619	122 $119,635	264 $191,932	609 $383,371	833 $818,659	1,244 $1,380,561	3,330 $3,307,107
China, British	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6 $3,000	.....	6 $3,000
China, French	.....	.....	.....	.....	.....	.....	.....	.....	.....	20 $9,325	2 $2,017	.....	22 $11,342
China, Japanese	.....	.....	1 $5,100	.....	1 $850	.....	.....	.....	.....	33 $17,796	10 $7,321	53 $45,167	98 $76,234
Chosen (Korea)	.....	.....	1 $10,270	3 $3,308	.....	7 $6,095	2 $1,795	2 $1,800	7 $4,780	5 $3,832	2 $1,300	7 $5,698	36 $38,878
British India	45 $26,067	7 $5,320	26 $22,372	150 $130,421	253 $203,740	439 $355,573	437 $379,954	315 $274,680	2,289 $1,638,262	5,603 $2,644,085	73 $53,428	31 $43,445	7,679 $5,787,317
Straits Settlements	9 $4,754	14 $12,040	21 $20,955	36 $28,951	120 $86,668	387 $319,247	262 $216,659	77 $70,210	376 $239,715	855 $585,820	287 $202,221	261 $302,791	2,721 $2,102,656
Other British East Indies	.....	.....	4 $2,875	12 $8,540	25 $20,882	39 $31,245	82 $73,175	25 $20,208	239 $168,685	110 $80,033	11 $17,740	42 $48,279	591 $473,037
Dutch East Indies	67 $36,629	63 $40,836	33 $21,768	42 $34,252	120 $70,055	278 $198,378	290 $208,722	105 $87,306	1,064 $753,128	3,206 $2,642,330	1,272 $1,302,800	2,299 $2,966,123	8,948 $8,442,316
French East Indies	.....	.....	.....	.....	.....	.....	.....	.....	8 $3,033	18 $17,967	18 $21,175	48 $60,787	92 $102,962
Hongkong	9 $7,372	1 $459	2 $3,788	1 $550	4 $2,740	7 $6,673	11 $13,043	2 $1,475	15 $10,858	38 $35,255	117 $91,228	200 $230,306	410 $406,055
Japan	16 $19,242	6 $4,996	12 $26,759	61 $58,933	118 $143,610	312 $364,507	96 $100,995	28 $29,210	153 $120,061	652 $481,748	2,139 $2,040,897	3,319 $3,643,400	6,918 $7,051,588
Persia	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2 $1,048	8 $425	10 $1,473
Russia in Asia	2 $1,884	.....	3 $1,760	.....	.....	1 $1,160	12 $14,998	551 $1,477,809	683 $529,385	1,072 $1,324,060	5 $8,425	41 $39,679	2,370 $3,399,160
Siam	4 $1,569	.....	4 $6,407	6 $6,540	18 $8,933	66 $35,934	37 $26,219	18 $10,317	41 $32,082	31 $15,915	65 $60,220	91 $83,915	366 $291,010
Turkey in Asia	.....	3 $7,900	1 $1,200	1 $652	1 $650	1 $824	7 $5,662	1 $1,000	.....	.....	.....	17 $11,443	32 $29,331
Oceania, British:													
Australia	62 $57,731	127 $81,426	437 $268,274	1,046 $874,112	2,597 $2,260,320	2,083 $1,896,990	3,099 $2,615,896	2,169 $1,768,479	5,336 $4,147,302	5,055 $3,792,571	4,307 $3,410,557	2,307 $3,200,280	28,711 $24,448,113
New Zealand	68 $120,533	60 $41,826	77 $55,236	413 $383,449	953 $946,736	958 $990,837	1,065 $974,708	938 $784,206	2,672 $2,055,843	3,554 $2,558,118	1,818 $1,453,311	1,712 $1,798,767	14,348 $12,236,217
Other British	.....	.....	.....	18 $24,414	76 $73,932	3 $2,396	9 $6,014	2 $2,081	28 $18,227	19 $11,062	30 $20,863	17 $13,945	201 $172,934
French	.....	.....	1 $900	.....	3 $2,920	11 $14,005	46 $45,184	8 $7,482	92 $56,789	22 $12,330	12 $7,612	11 $12,686	206 $159,908
German	.....	.....	.....	.....	.....	1 $350	.....	7 $5,000	1 $3,208	12 $5,847	12 $11,029	11 $7,300	44 $32,730
Philippine Islands	2 $1,205	24 $27,410	130 $175,626	309 $382,551	401 $557,368	517 $577,040	614 $697,175	407 $425,001	861 $859,450	1,019 $686,731	1,714 $1,373,204	607 $617,808	6,681 $6,395,456
Africa:													
British Africa, West	.....	.....	.....	.....	.....	4 $2,688	32 $18,319	42 $20,899	63 $35,361	240 $144,838	202 $115,772	111 $106,567	694 $444,444
South	2 $1,817	26 $22,152	76 $61,185	135 $126,734	331 $306,606	1,279 $1,157,895	1,618 $1,437,883	695 $731,278	2,859 $2,040,977	3,423 $2,378,380	2,142 $1,706,136	1,226 $1,728,584	15,813 $11,700,774
East	.....	5 $4,402	11 $10,463	2 $2,511	22 $14,998	14 $12,802	49 $34,430	120 $75,188	237 $137,245	94 $55,681	112 $75,778	51 $45,911	717 $469,409
Canary Islands	.....	2 $1,804	1 $850	.....	3 $2,066	10 $6,426	15 $6,956	27 $12,015	51 $32,935	31 $24,525	15 $5,378	.....	155 $94,381
Egypt	2 $887	1 $1,300	1 $998	4 $10,097	6 $2,872	16 $10,156	22 $11,437	1 $695	25 $18,352	58 $22,113	21 $17,300	50 $46,834	187 $146,543
French Africa	1 $950	4 $7,611	11 $18,188	21 $14,214	50 $20,164	10 $7,297	19 $17,273	.....	2 $1,155	41 $13,315	121 $50,550	152 $98,307	412 $249,024
German Africa	.....	.....	.....	.....	.....	6 $3,175	19 $14,136	7 $4,865	20 $7,760	.....	.....	.....	51 $29,936
Italian Africa	.....	.....	.....	.....	.....	.....	.....	.....	.....	3 $1,200	.....	.....	3 $1,200
Liberia	.....	.....	.....	.....	.....	1 $805	.....	.....	.....	1 $975	12 $4,220	.....	14 $6,000
Madagascar	.....	.....	.....	.....	.....	.....	.....	.....	7 $2,532	1 $808	2 $1,659	.....	10 $4,999
Morocco	.....	.....	.....	.....	.....	.....	63 $29,497	25 $10,847	52 $20,574	87 $39,670	35 $17,718	113 $64,217	375 $182,523
Portuguese Africa	1 $2,110	.....	7 $5,302	3 $2,669	16 $13,096	20 $16,102	24 $21,563	6 $7,301	56 $38,510	7 $5,429	9 $9,673	15 $12,102	164 $133,857
Totals	2,862 $4,890,886	3,184 $5,387,021	6,926 $9,548,700	11,803 $12,965,049	21,767 $21,550,139	24,293 $24,275,793	28,306 $25,392,963	23,880 $21,113,953	56,234 $40,660,263	64,808 $48,612,632	52,312 $45,331,360	36,969 $43,671,084	340,794 $307,022,786

Exports of Automotive Parts 1907-1919

From Slightly More Than Half a Million Dollars, Exports of Parts Have Increased to $37,342,594 in 1919

Not Including Engines and Tires

	1907	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	Totals all years inc. 1918
Europe:													
Austria-Hungary	$717	$669	$2,511	$1,412	$2,195	$4,572	$5,198	$1,045	.....	.....	.....	.....	$19,406
Azores and Madeira Island	.....	.....	50	67	99	720	1,384	1,800	$1,532	$1,270	$198	$1,792	8,912
Belgium	5,187	512	9,991	2,922	13,614	4,897	20,978	446	.....	.....	906	41,836	102,180
Bulgaria	.....	.....	.....	171	823	40	390	.....	.....	.....	.....	.....	1,424
Denmark	2,029	764	2,339	3,007	2,996	6,646	8,664	13,710	31,886	53,917	1,048	44,172	173,597
Finland	.....	.....	.....	486	1,104	1,799	2,931	1,178	5,627	55	.....	78	13,258
France	23,477	17,833	54,035	58,999	85,537	165,950	179,351	480,764	2,216,823	3,700,812	3,999,904	4,174,107	15,180,552
Germany	14,252	4,090	10,023	41,966	80,036	113,602	213,351	13,770	.....	.....	.....	.....	498,711
Gibraltar	.....	.....	57	.....	100	.....	514	229	617	525	61	78	2,181
Greece	.....	427	.....	100	454	379	807	2,010	24,724	12,604	4,675	87,977	134,157
Iceland and Faroe Island	.....	.....	.....	.....	.....	17	180	880	456	2,608	2,757	7,987	14,885
Italy	5,502	1,144	4,421	26,636	6,304	14,156	50,580	65,521	115,260	180,977	99,947	85,109	659,172
Malta, Gozo & Cyprus Island	.....	.....	.....	.....	.....	.....	.....	.....	.....	54	.....	.....	90
Netherlands	1,049	2,223	3,532	4,548	6,440	14,135	7,634	3,055	41,525	96,200	3,625	190,402	374,987
Norway	400	699	2,684	1,042	934	1,636	1,893	15,607	59,769	100,542	18,855	170,315	383,998
Portugal	.....	205	394	1,618	865	920	2,357	3,239	45,356	66,929	20,274	47,567	189,724
Roumania	.....	.....	.....	460	2,734	1,003	887	.....	391	.....	.....	56,618	62,093
Russia in Europe	4,004	3,776	7,004	6,753	1,743	9,566	14,079	123,667	2,498,879	1,624,431	328,633	1,687	4,624,765
Serbia, Montenegro and Albania	.....	.....	.....	113	.....	.....	.....	.....	4,932	.....	.....	350	5,395
Spain	3,620	260	2,854	2,267	3,755	3,192	6,266	7,347	32,743	95,720	154,850	132,760	445,763
Sweden	9,748	1,270	3,818	6,521	3,789	4,276	6,140	4,211	37,917	26,891	4,032	8,361	208,102
Switzerland	178	1,409	1,894	.....	.....	457	1,069	400	1,150	565	54	8,681	16,639
Turkey in Europe	.....	56	.....	35	964	116	.....	267	.....	.....	.....	78,228	79,666
England		125,726	240,329	320,755	931,909	922,866	1,282,388	3,282,973	7,202,475	6,121,211	6,329,114	5,974,111	33,025,198
Scotland	*116,248	6,205	238	1,352	874	1,485	23,269	29,403	52,414	22,146	955	172,059	310,400
Ireland		6	54	350	523	451	250	208	7,181	1,264	.....	4,763	15,050
North America:													
Bermuda	.....	8	.....	50	52	330	254	125	615	64	7	.....	1,701
British Honduras	193	40	73	26	165	509	163	684	548	1,379	2,638	4,542	11,341
Canada	195,989	230,509	1,023,368	1,726,842	2,392,592	3,104,097	3,663,879	2,741,178	7,492,639	9,148,110	12,054,824	12,618,305	56,636,664
Central American States:													
Costa Rica	255	346	2,376	1,376	1,320	4,516	6,208	5,041	10,162	7,498	23,613	5,039	67,909
Guatemala	24	1,188	2,124	4,970	2,062	1,851	1,613	732	2,367	9,852	9,111	10,389	48,141
Honduras	1,465	61	48	61	151	308	1,053	6,870	15,649	12,639	11,952	10,881	61,424
Nicaragua	160	60	38	30	86	741	47	609	666	964	2,264	18,655	24,320
Panama	274	2,182	3,180	4,927	4,689	11,738	16,988	25,861	34,180	56,657	72,180	78,882	242,011
Salvador	.....	843	526	1,195	2,790	2,242	2,481	2,371	3,717	11,314	10,179	25,311	62,969
Mexico	131,553	104,984	81,248	35,506	47,479	46,743	41,508	30,819	42,258	125,823	431,440	597,980	1,764,620
Miquelon, Langley & St. Pierre Is.	.....	.....	.....	.....	.....	.....	300	.....	25	5	65	215	610
Newfoundland and Labrador	132	435	1,508	2,001	2,026	2,993	3,901	3,632	8,672	9,972	4,129	14,780	54,231
West Indies, British:													
Barbados				3,866	3,209	5,055	4,177	4,216	6,383	14,452	15,089	140,633	197,080
Jamaica	†2,310	†6,295	†14,085	11,003	23,569	25,355	24,693	32,337	53,867	54,854	65,429	70,343	387,944
Trinidad and Tobago				1,817	4,847	9,119	13,003	12,865	21,826	44,060	55,794	73,530	236,861
Other British				422	1,426	1,157	2,538	3,707	9,303	12,863	21,446	35,800	88,667
Cuba	18,095	27 385	49,088	31,323	31,594	35,928	48,217	101,429	411,731	906,710	1,028,279	1,553,840	4,282,785
Danish (Virgin Island of U.S.)	.....	39	.....	.....	558	1,640	1,206	865	975	1,876	2,844	10,814	20,817
Dominican Republic	.....	103	253	2,871	3,381	1,331	3,439	3,633	12,389	35,301	39,816	82,690	193,393
Dutch	.....	.....	.....	242	281	1,767	2,754	4,598	3,288	6,052	4,707	3,797	27,486
French	50	164	101	20	97	198	8,099	7,423	9,546	21,672	53,518	65,374	169,390
Haiti	.....	20	.....	5	331	2,212	1,095	185	3,285	3,962	24,385	33,670	69,240
South America:													
Argentina	10,137	8,244	22,150	19,522	70,446	74,138	92,663	49,990	222,637	1,458,111	3,088,534	2,276,380	7,403,005
Bolivia	190	.....	.....	190	25	172	1,209	2,880	3,453	11,864	14,533	17,046	51,662
Brazil	8,665	8,527	7,802	15,769	35,680	108,859	84,602	28,633	59,935	134,326	233,414	527,305	1,252,207
Chile	3,527	1,348	663	484	2,656	4,711	22,405	14,721	72,939	248,043	806,015	775,556	1,956,056
Colombia	17	422	2,286	6,456	7,681	18,676	19,970	9,695	18,967	27,777	40,717	39,067	192,031
Ecuador	.....	365	613	251	3,461	9,115	6,324	4,458	8,014	12,648	12,964	16,511	74,996
Guiana:													
British	.....	852	1,303	2,012	3,181	3,809	4,583	5,116	6,809	23,597	35,081	46,180	132,651
Dutch	.....	.....	7	.....	12	39	911	1,702	2,052	3,212	3,282	4,885	16,702
French	.....	.....	.....	.....	6	125	.....	165	328	11	2,337	112	3,084
Paraguay	.....	.....	.....	.....	32	.....	.....	1,030	848	228	698	46	2,972
Peru	1,666	745	1,884	1,115	1,604	2,550	5,982	4,727	5,458	27,332	88,098	165,025	308,003
Uruguay	.....	391	1,390	8,637	12,599	32,978	21,401	14,359	27,086	125,913	183,005	299,124	737,584
Venezuela	.....	.....	9	1,224	4,648	20,123	36,286	28,750	40,783	87,768	57,873	85,684	363,548
Asia:													
Aden	.....	.....	.....	.....	.....	502	1,676	361	998	4,541	263	2,834	11,175
China	690	787	845	3,240	2,254	3,134	5,825	5,265	21,661	54,753	60,134	152,201	312,725
China:													
British	.....	.....	.....	.....	.....	.....	.....	.....	46	.....	.....	.....	46
French	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,747	.....	.....	1,747
German	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	290	.....	290
Japanese	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	382	64,372	64,754
Chosen	.....	540	.....	.....	748	2,271	2,791	282	10,377	2,125	2,812	17,617	39,563
East Indies, British:													
British India	2,444	4,623	6,387	11,741	14,568	18,336	47,923	44,735	129,562	345,855	294,909	343,096	1,228,316
Straits Settlements	1,343	1,786	1,172	3,202	5,273	14,660	25,100	20,388	39,025	70,043	69,968	167,339	420,702
Other British	.....	84	170	672	829	901	4,099	4,062	8,540	27,710	23,273	10,791	81,132
Dutch	1,758	5,135	4,577	2,627	3,452	11,453	15,368	15,232	34,638	193,225	192,430	713,389	1,198,452
French	.....	.....	.....	.....	.....	.....	.....	274	.....	.....	1,998	9,024	11,296
Hongkong	123	252	290	119	2,711	92	626	1,088	2,180	2,885	7,702	28,268	46,632
Japan	5,021	498	3,375	4,997	39,681	51,619	35,637	26,028	30,446	116,130	319,038	682,053	1,315,109
Persia	.....	.....	.....	.....	.....	.....	.....	174	.....	.....	1,090	3,080	4,344
Russia in Asia	.....	.....	67	591	.....	.....	.....	107,351	226,255	146,083	25,512	165,935	671,944
Siam	2,134	1,007	921	283	970	1,925	4,905	2,451	34,412	9,734	7,639	9,224	76,772
Turkey in Asia	.....	.....	.....	570	30	239	67	214	.....	.....	.....	9,009	10,129
Oceania, British:													
Australia	3,826	14,227	21,533	53,940	102,427	166,176	202,363	199,154	389,690	753,309	1,052,986	1,849,426	4,816,205
New Zealand	25,625	1,392	5,150	16,306	26,095	37,438	53,644	48,111	176,618	285,654	309,658	507,587	1,495,030
Other British	.....	.....	.....	311	971	479	1,060	665	1,991	4,751	4,674	6,943	21,845
French	.....	.....	.....	200	495	3,032	7,560	5,730	5,640	4,383	6,272	5,639	38,951
German	.....	.....	.....	.....	.....	220	396	.....	66	936	7,138	6,789	15,543
Philippine Islands	4,168	7,859	17,154	62,581	62,631	53,434	69,933	40,228	63,756	116,670	178,036	652,461	1,330,692

*Included in totals of exports to England.
†Included in totals of exports to Jamaica.

Exports of Automotive Parts, 1907-1919—Continued

	1907	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	Totals all year incl. 1908
Africa:													
Belgian Congo	.....	.....	.....	.....	.....	.....	.....	.....	$34	.....	.....	.....	$34
British:													
West	.....	.....	.....	.....	$56	$465	$5,743	$6,537	20,311	$64,938	$49,077	$69,550	126,677
South	$3,000	$4,088	$14,655	$15,486	29,123	62,304	157,246	100,240	286,401	422,200	811,323	745,325	2,652,193
East	.....	.....	2,473	981	851	1,444	3,203	3,929	11,371	9,599	23,290	17,870	75,011
Canary Islands	.....	23	76	30	13	879	1,505	1,939	2,111	3,261	1,300	20	11,157
Egypt	110	10	277	169	99	295	130	1,494	4,751	2,623	716	13,384	24,438
French Africa	.....	.....	.....	339	327	73	200	2,660	2,458	2,316	7,163	56,041	71,577
German Africa	.....	.....	.....	.....	.....	.....	999	522	21,098	.....	.....	.....	22,619
Liberia	.....	.....	.....	.....	.....	.....	.....	13	.....	33	106	13	165
Madagascar	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	175	40	219
Morocco	.....	.....	.....	.....	.....	.....	166	3,386	9,928	2,431	7,347	34,401	57 659
Portuguese Africa	.....	38	47	115	910	1,222	1,585	3,431	7,064	5,339	1,160	1,444	22,429
Spanish Africa	.....	.....	.....	.....	.....	.....	.....	103	.....	.....	.....	.....	103
Totals	$611,355	$605,179	$1,641,520	$2,544,180	$4,107,155	$5,240,599	$6,624,232	$7,853,183	$22,536,485	$27,420,913	$32,933,006	$37,342,594	$149,972,085

Imports of Passenger Cars for 12 Years

American Purchases of Foreign Automobiles Have Steadily Declined as Domestic Production Increased

	1908	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	Total all years incl. 1909
Austria-Hungary	.....	1	.....	4	14	4	1	.....	.....	.....	.....	24
	.....	$624	.....	$9,591	$30,102	$8,294	$2,233	.....	.....	.....	.....	$50,844
Belgium	4	12	12	32	56	9	.....	.....	.....	.....	.....	128
	$8,537	$29,087	$26,180	$59,941	$144,693	$19,582	.....	.....	.....	.....	.....	$295,100
France	793	782	377	401	357	134	62	49	11	.....	.....	3,975
	$1,775,589	$1,467,646	$797,931	$964,635	$814,392	$304,716	$131,936	$115,643	$29,497	.....	.....	$8,240,638
Germany	32	150	137	116	99	21	6	.....	.....	.....	.....	625
	$124,747	$368,219	$297,153	$250,313	$261,168	$45,680	$13,606	.....	.....	.....	.....	$1,554,466
Italy	132	352	130	131	116	55	111	1	1	1	.....	1,358
	$331,363	$587,052	$239,079	$200,530	$205,931	$79,464	$122,446	$1,023	$1,100	$1,280	.....	$2,330,888
Netherlands	.....	3	2	.....	1	1	6	6	1	.....	.....	20
	.....	$6,652	$2,573	.....	$500	$1,136	$11,245	$8,880	$1,600	.....	.....	$32,586
Spain	.....	.....	.....	.....	.....	.....	2	1	.....	.....	.....	4
	.....	.....	.....	.....	.....	.....	$6,592	$2,637	.....	.....	.....	$10,700
Sweden	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....	2
	.....	.....	.....	.....	$3,944	$3,175	.....	.....	.....	.....	.....	$7,119
Switzerland	2	28	55	14	2	1	.....	.....	.....	.....	.....	119
	$5,665	$60,554	$118,474	$32,125	$3,103	$1,199	.....	.....	.....	.....	.....	$267,182
England	.....	101	128	187	78	40	73	36	57	18	3	856
	.....	$236,015	$297,382	$431,066	$218,932	$115,042	$178,065	$80,615	$137,119	$29,658	$7,650	$2,126,875
Scotland	65*	.....	.....	1	.....	.....	1	.....	1	.....	.....	25
	$199,377*	.....	.....	$2,570	.....	.....	$1,700	.....	$350	.....	.....	$27,066
Ireland	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
	.....	.....	.....	.....	.....	.....	.....	$803	.....	.....	.....	$803
Canada	13	36	38	75	19	25	42	1,350	31	35	84	1,757
	$40,720	$69,737	$98,019	$171,366	$32,815	$29,940	$35,143	$579,168	$18,114	$21,240	$28,731	$1,146,468
Mexico	.....	3	2	1	.....	.....	11	28	3	.....	1	49
	.....	$12,500	$5,000	$1,544	.....	.....	$8,425	$8,392	$500	.....	$260	$36,621
Newfoundland and Labrador	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	2
	.....	.....	.....	.....	$2,800	.....	.....	.....	.....	.....	.....	$2,800
Cuba	4	3	6	.....	3	4	4	1	.....	1	.....	29
	$14,316	$8,575	$16,302	.....	$11,000	$4,100	$11,000	$3,500	.....	$400	.....	$78,593
Argentina	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1
	.....	.....	.....	.....	.....	.....	$1,925	.....	.....	.....	.....	$1,925
Japan	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
	.....	.....	.....	.....	.....	$1,282	.....	.....	.....	.....	.....	$1,282
Australia	.....	.....	.....	.....	.....	1	2	.....	.....	.....	.....	3
	.....	.....	.....	.....	.....	$1,703	$987	.....	.....	.....	.....	$2,690
New Zealand	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
	.....	.....	.....	.....	.....	.....	.....	$1,250	.....	.....	.....	$1,250
Philippine Islands	.....	.....	.....	.....	.....	3	.....	.....	.....	.....	.....	3
	.....	.....	.....	.....	.....	$5,180	.....	.....	.....	.....	.....	$5,180
Russia	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	1
	.....	.....	$750	.....	.....	.....	.....	.....	.....	.....	.....	$750
Panama	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1
	.....	.....	.....	$1,500	.....	.....	.....	.....	.....	.....	.....	$1,500
British West Indies	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
	.....	$2,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	$2,500
China	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
	.....	$2,285	.....	.....	.....	.....	.....	.....	.....	.....	.....	$2,285
Totals	1,045	1,473	888	963	748	300	322	1,474	105	50	88	8,990
	$2,500,314	$2,851,446	$1,898,843	$2,134,181	$1,759,380	$620,493	$525,303	$801,911	$188,280	$52,578	$36,641	$16,215,761

*Included with totals for England.

Automotive Exports for Four Months of 1920 Fiscal Year

	Cars	Trucks	Parts	Pneumatic Tires	Gasoline Tractor Engine
Austria-Hungary	12 $15,000	10 $5,000	.....	$28,929	.....
Azores and Madeira Island	.....	.....	$550	.....	.....
Belgium	1,093 $1,081,071	94 $157,343	$78,693	$250,612	161 $123,090
Bulgaria	.....	.....	.....	.....	.....
Denmark	1,324 $1,453,397	315 $642,527	$380,120	$699,285	673 $519,235
Finland	149 $198,531	7 $6,848	$8,119	.....	.....
France	257 $426,196	931 $4,258,019	$419,236	$273,358	1,347 $954,547
Germany	.....	.....	.....	.....	.....
Gibraltar	4 $1,875	.....	$716	$175	.....
Greece	84 $132,729	6 $6,069	$19,966	$13,148	4 $6,521
Iceland and Faroe Islands	41 $33,530	18 $12,300	$6,840	$17,182	2 $3,200
Italy	13 $23,401	2 $5,500	$24,228	$123,228	15 $28,800
Malta, Gozo and Cyprus	17 $13,214	.....	$112	.....	.....
Netherlands	476 $585,232	33 $133,465	$64,633	$487,922	24 $18,398
Norway	962 $1,175,612	374 $735,244	$173,346	$345,524	69 $74,641
Portugal	140 $166,846	13 $32,836	$7,714	$76,609	2 $6,315
Roumania	31 $109,452	68 $69,753	$22,200	$19,047	2 $3,300
Russia in Europe	2 $1,180	1 $2,000	.....	$152	.....
Serbia, Montenegro, etc	.....	.....	.....	.....	....
Spain	635 $810,940	84 $200,649	$94,651	$288,937	$95,190
Sweden	975 $1,270,623	128 $262,496	$45,702	$717,870	127 $133,505
Switzerland	202 $191,653	3 $2,577	$17,813	$96,711	3 $3,742
Turkey in Europe	.....	3 $11,900	.....	$3,720	10 $14,000
England	2,607 $2,666,848	131 $203,894	$2,170,513	$294,462	724 $536,191
Scotland	9 $19,013	.....	$24,246	$150	1 $72
Ireland	435 $414,602	14 $19,081	$10,836	.....	206 $94,634
North America:					
Bermuda	.....	.....	$120	$213	.....
British Honduras	8 $4,083	.....	$2,063	$3,273	1 $1,550
Canada	3,097 $3,525,583	725 $1,192,204	$6,527,795	$308,806	925 $740,224
Central American States:					
Costa Rica	9 $9,975	.....	$2,600	$2,156	1 $837
Guatemala	70 $85,337	2 $2,361	$6,397	$28,598	1 $768
Honduras	5 $4,061	5 $81,489	$8,461	$13,361	.....
Nicaragua	18 $15,502	4 $1,875	$8,346	14,040	.....
Panama	81 $75,946	10 $16,835	$29,515	$145,961	2 $6,477
Salvador	27 $43,428	.....	$16,638	$17,861	1 $2,100
Mexico	853 $645,629	318 $338,261	$215,681	$221,089	78 $98,837
Miquelon, Langley & St. Pierre Is.	.....	2 $2,000	$93	.....	.....
Newfoundland and Labrador	68 $74,946	6 $14,789	$14,402	$9,631	.....
West Indies, British:					
Barbados	30 $22,578	4 $2,015	$6,296	$10,572	6 $4,071
Jamaica	39 $37,477	2 $4,434	$34,452	$44,228	1 $259
Trinidad	84 $59,383	18 $38,476	$29,667	$22,867	7 $8,814
Other British	21 $15,047	4 $2,015	$6,621	$8,714	4 $4,650
Cuba	812 $833,819	220 $488,055	$378,870	$609,004	71 $108,217
Danish (Virgin Islands of U.S.)	13 $8,488	.....	$1,748	$5,388	1 $1,400
Dominican Republic	82 $75,349	29 $42,763	$24,916	$52,267	9 $9,415
Dutch	2 $1,250	1 $1,991	$2,098	$1,818	2 $704
French	62 $53,807	24 $39,813	$23,222	$47,852	7 $6,141
Haiti	30 $28,155	2 $1,006	$18,285	$20,187	4 8,472
South America:					
Argentina	545 $718,027	70 $127,294	$1,238,988	$636,142	108 $94,729
Bolivia	5 $2,415	6 $7,876	$4,891	$7,404	.....
Brasil	1,447 $1,088,365	55 $57,455	$235,655	$280,259	16 $16,863
Chile	58 $73,442	18 $39,700	$121,503	$109,736	101 $87,915
Colombia	109 $114,282	3 $7,611	$23,187	$39,569	2 $2,200
Ecuador	48 $52,505	3 $2,965	$7,672	$17,637	1 $1,400
Falkland Island	4 $5,788	.....	.....	.....	.....
Guiana, British	20 $11,818	20 $12,742	$9,975	$5,647	1 $2,250
Dutch	.....	1 $506	$1,155	$514	.....
French	3 $2,167	2 $1,007	$58	.....	.....
Paraguay	12 $5,280	.....	$1,953	.....	.....
Peru	266 $179,599	96 $111,392	$16,271	$59,815	143 $114,633
Uruguay	243 $352,271	4 $8,380	$86,814	$257,624	3 $19,059
Venezuela	123 $117,199	13 $9,196	$37,831	$87,982	2 $2,360
Asia:					
Aden	15 $12,076	.....	$2,120	$1,847	.....
China	217 $315,208	84 $238,815	$49,061	$65,951	3 $3,638
China, Japanese	20 $9,663	.....	$15	.....	.....
Chosen	3 $2,669	.....	$23,565	$2,367	.....
British India	1,159 $1,254,204	97 $217,529	$145,728	$96,556	56 $44,189
Straits Settlements	162 $185,733	37 $74,454	$32,958	$203,792	10 $9,591
Other British East Indies	51 $50,738	5 $7,059	$5,202	$6,227	3 $1,358
Dutch East Indies	402 $490,541	85 $169,354	$72,770	$219,839	26 $36,113
French East Indies	1 $1,200	.....	$2,259	$88	.....
Hongkong	19 $30,033	2 $3,850	$7,529	$9,030	.....
Japan	769 $664,585	126 $210,384	$160,600	$105,065	18 $28,879
Persia	2 $1,150	.....	$160	$692	.....
Russia in Asia	11 $24,200	8 $12,040	$140	$2,806	1 $6,000
Siam	3 $3,300	.....	$3,122	$1,524	.....
Turkey in Asia	25 $20,282	.....	$150	.....	.....
Oceania, British:					
Australia	1,197 $1,224,271	89 $138,339	$293,094	$187,781	63 $79,155
New Zealand	1,184 $1,306,061	84 $201,356	$196,547	$349,437	41 $51,668
Other British	5 $3,909	3 $3,030	$3,437	$2,011	.....
French	3 $1,800	1 $600	$3,327	$4,308	.....
German	1 $600	1 $550	$2,322	$4,709	.....
Philippine Islands	633 $745,642	137 $222,192	$69,323	$245,383	176 $184,144
Africa:					
Belgian Congo	.....	.....	$7,036	.....	.....
British Africa:					
West	176 $208,410	77 $86,944	$58,625	$33,769	.....
South	1,196 $1,346,514	7 $17,081	$178,016	$144,791	49 $32,525
East	13 $12,518	.....	$16,025	$585	6 $10,884
Canary Islands	5 $9,097	5 $4,312	$907	$3,573	.....
Egypt	65 $45,415	6 $3,518	$2,040	$8,346	9 $5,052
French Africa	55 $39,561	15 $14,783	$12,561	$1,857	136 $170,420
Morocco	88 $55,084	11 $12,402	$3,866	$255	.....
Portuguese Africa	5 $4,927	2 $1,008	$1,682	.....	2 $6,970
Liberia	.....	.....	$53	$45	.....
Totals	25,242 $27,203,347	4,813 $11,063,589	$14,067,695	$8,529,830	5,536 $4,630,612

The 1920 Trend in Truck Design

The tendency to build trucks larger than two tons for pneumatic tire equipment is the outstanding feature at the beginning of the year. Next comes the influence of the Class B Military truck, the higher speed engines, influence of good roads, gains for the internal gear final drive, and the prospect of increased prices

By J. Edward Schipper

IN outlining the engineering trends of truck design, the outstanding feature is the tendency toward pneumatic equipment in capacities above two tons. If this development goes forward at the rate predicted by the big tire manufacturers and a great many of the truck builders it will have a radical effect on truck design during the next two years.

Pneumatic tire sizes above 12 in. in diameter have already been developed, and it remains to be seen if the truck manufacturers will utilize them on their larger trucks. If they do, it will mean higher engine speed and lighter chassis parts, and in general a higher pay load as compared with the weight of the truck. Up to date the development work along these lines has been done by the tire companies to a greater extent than by the truck companies. During the coming year the experimental departments of the larger truck companies will no doubt go into the matter in even greater detail than the tire manufacturers have during the past year.

The establishment of long-distance hauling at high rates of speed on heavy-capacity vehicles has practically compelled the use of pneumatics, and the limits of the truck engine and chassis designed for solid tire work were soon reached when the truck was mounted on pneumatic tires. Changes in the speed range and gear ratios will only be a minor part of the complete overhauling in design which may be expected from this important development.

Influence of Class B Military Truck

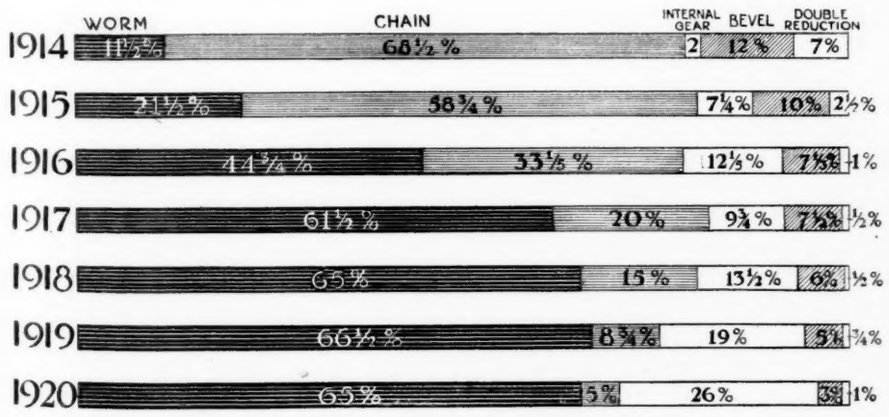
Looking over the new models brought out during the year 1919, the fact which impresses one most is the marked effect on commercial designs of the class B military truck. If the eagerness with which truck manufacturers have adopted a great many of the features of this truck is any criterion, they regard it as the best that the combined efforts of leading truck engineers were capable of. To give an example of the effect of the military truck design on commercial practice, it is only necessary to study the gearboxes fitted during the past year. In the class B military truck a four-speed gearbox was used, with an extremely low low-gear ratio, to obtain a practically nonstallable vehicle. This same feature has been incorporated on many of the trucks for 1920, and a majority of the trucks of 2, 2½ and 3½ tons capacity now have a four-speed gearbox for 1920, whereas they had three-speed boxes in 1919.

Competition is not as tense in small capacity trucks as it is in low-priced passenger cars. A truck manufacturer can "get away with" a fairly small production, to use a common-place expression. This is evident by the fact that there are ninety different models of 1½-ton trucks on the market, and seventy-three models of 2-ton. The 1½-ton truck is the most popular type, meeting the requirements of a wide field. However, there is a strong tendency toward an increased number of 2-ton trucks, particularly in territories where good roads permit of fairly long hauls. The increased use of the pneumatic tire on the 2-ton truck is also promoting the popularity of this model to a considerable extent.

Engine Development

A great many truck engineers believe we are on the eve of important engine developments in the truck field. There is no doubt that these developments will be largely due to higher speeds demanded of trucks. With the fitting of pneumatic tires to the 2-ton and 3½-ton models the average speeds have risen from 12 miles per hour up to 18, and even 25 miles per hour in the sparsely settled districts. This is too high a speed range for the type of truck engine which has come to be associated with solid tires. These engines run at 1200 to 1400 r.p.m. and are not sufficiently flexible to function efficiently in connection with the gear ratios demanded with pneumatic tires. If the use of pneumatics is carried forward, it is probable that truck engines will peak at nearer 1800 and 2000 r.p.m.

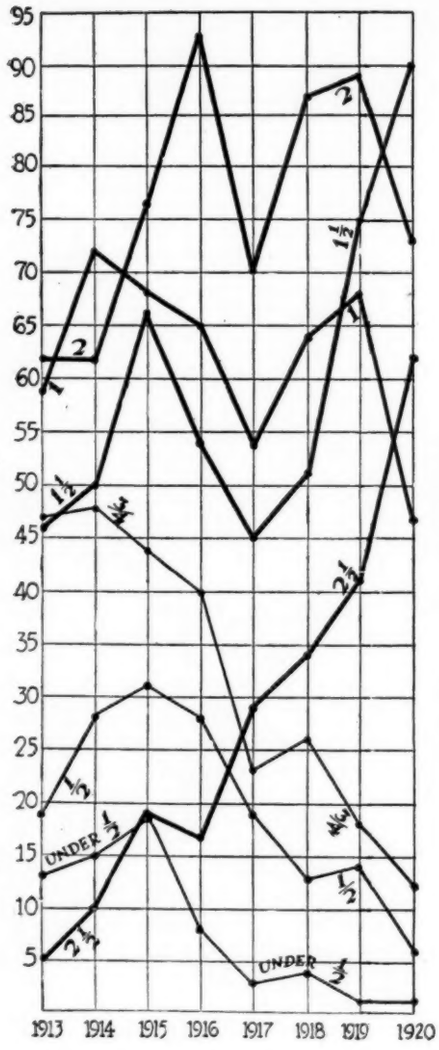
It is very probable that on these higher speed engines the governor equipment will be modified, and for certain types of service engine governors will not be utilized. As a matter of fact, developments in this line will depend very largely upon the construction of good roads.



Percentage of use of drives

Road Construction an Influence

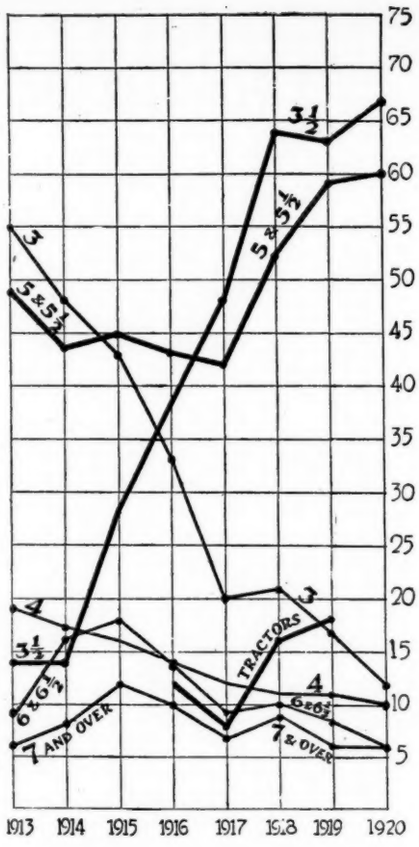
At the present time there are about 2,500,000 miles of roads in the United States, of which less than 300,000



TRUCK DESIGN FOR 1920

These graphs illustrate the tendency of makers as to capacity of the models. On the left are the lighter types and at the right the heavier. It will be noted that the 3-ton continues toward the disappearing point.

Other graphs show the tendencies as to drives and prices. It is interesting to note that the gain of the worm drive has been checked and the internal gear has increased.



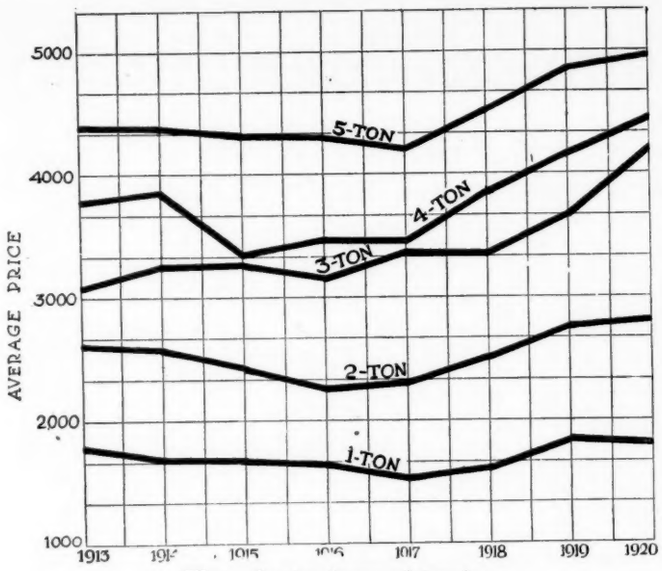
These curves and others used in this article are based on specifications compiled during the past 8 years by the Class Journal Co. and do not take into account the number of vehicles of a given model sold

miles are hard surfaced. This conditions will no doubt change rapidly during the next few years, on account of the big appropriations made, not only by the individual States, but also by the Federal Government, for the development of National Highway systems. The total money available for road building throughout the United States is about $2,000,000,000, of which about $400,000,000 is available for the development of the National Highway system.

This immense amount of money could not be expended in less than three years with present labor and material conditions. The fact, however, that referenda on road appropriations are practically always carried, shows that there is a marked tendency throughout the country for the

The Average Truck of 1920 as

	Year	Price	Engine		H.P.	Water Circulation	Radiator		Ignition	Spark Advance	Electric System
			Bore	Stroke			Core	Case			
½-ton...	1920	$992	3⅛	4½	15.64	Thermo-syphon...	Cellular....	Pressed steel.	Single...	Hand....	Starting, lighting & ignition..
	1919	934	3¼	5	16.92	Thermo-syphon...	Cellular....	Pressed steel.	Single...	Hand....	Starting, lighting.....
¾-ton...	1920	1453 (1918)	3½	5	19.61	Thermo-syphon...	Cellular....	Pressed steel.	Single...	Hand....	Starting, lighting.....
	1919	1390	3½	5	19.61	Thermo-syphon...	Cellular....	Pressed steel.	Single...	Hand....	None.....
1-ton....	1920	1799	3½	5	19.61	Thermo-syphon...	Finned tube	Cast.....	Single...	Hand....	Starting, lighting.....
	1919	1815	3¾	5	22.50	Thermo-syphon...	Finned tube	Cast.....	Single...	Hand....	None.....
1½-ton..	1920	2266	3¾	5	22.50	Centrifugal.....	Finned tube	Cast.....	Single...	Hand....	Starting, lighting.....
	1919	2224	3¾	5	22.50	Centrifugal.....	Finned tube	Cast.....	Single...	Hand....	None.....
2-ton....	1920	2809	4⅛	5¼	27.20	Pump (centrifugal)	Finned tube	Cast.....	Single...	Hand....	None.....
	1919	2758	4	5¼	25.60	Pump.....	Finned tube	Cast.....	Single...	Hand....	None.....
2½-ton..	1920	3020	4⅛	5¼	27.20	Pump (centrifugal)	Finned tube	Cast.....	Single...	Hand....	None.....
	1919	2950	4⅛	5¼	....	Pump (centrifugal)	Finned tube	Cast.....	Single...	Hand....	None.....
3½-ton..	1920	3999	4½	5½	32.40	Pump (centrifugal)	Finned tube	Cast.....	Single...	Hand....	None.....
	1919	3904	4½	5½	32.40	Pump (centrifugal)	Finned tube	Cast.....	Single...	Hand....	None.....
5-ton....	1920	4950	4¾	6	36.15	Centrifugal.....	Finned tube	Cast.....	Single...	Hand....	None.....
	1919	4647	4¾	6	36.15	Centrifugal.....	Finned tube	Cast.....	Single...	Hand....	None.....



The price tendency of trucks

development of highways, which in turn will have a most important bearing on the truck and allied industries.

There have been very few mechanical changes in truck engines during the past year. Manifolds have been redesigned to some extent so that the intake is partially heated by the exhaust to assist in vaporization in cold weather, and also to reduce the length of time required to warm a cold engine.

Electrical Equipment

Another important feature is the marked tendency toward the fitting of electrical equipment on trucks. There are six ½-ton models on the market for 1920, and all of these are furnished with electric lighting, and two have starting as standard equipment. Of the twelve ¾-ton models, five have electric starting, lighting and ignition. In the 1-ton size, two out of ten which are furnished with electric lighting have it specified as standard equipment, while the other eight models provide it as an extra, the cost varying from $35 to $125.

On eleven other 1-ton models, which may be had with electric starting and lighting, only one model has it as standard equipment, the others furnishing it at an extra charge. On the heavier trucks there is an increasing tendency toward fitting full electric equipment.

Another likely development in truck engines is the use of temperature control. At present the Packard company is the only concern fitting a thermostat to its truck, but it is very well possible that others will follow suit this year.

In the development of clutches there is not much new to relate. The dry disk clutch, which gained supremacy in the field during 1919, still holds the lead. Clutches of this design have gone upward of 75,000 miles without adjustment on passenger cars, and are giving equally satisfactory service on trucks.

Transmission gearsets have not varied in type, except for the addition of the fourth speed. There have been no noticeable changes in design, for the gearset is practically a standard part.

As to Drives

The final drive situation shows a gain for the internal gear, when considered on the basis of number of models. Considered on the basis of production, the situation remains about the same as last year, except for a decrease in the use of chain drive. When considered on the basis of models—which is the true way of determining popularity, as each model may be considered a ballot cast by the engineering department of the producing company—the internal gear drive has attained a representation of 26 per cent, whereas in 1919 it was found only on 19 per cent of the models.

The worm drive has about maintained its position, the percentage being 66½ per cent for 1919 and 65 per cent for 1920. The gain of the internal gear has been at the expense of the chain and bevel drives, these having dropped from 8¾ to 5 per cent and from 5 to 3 per cent respectively. There are many, however, who predict that there will be a marked increase in the use of bevel gear drive if the pneumatic tires become common on the 2 and 3½-ton sizes.

As far as prices are concerned, there is very little increase over the average price of 1919, considering the labor and material situation. The average percentage of increase for all models is 4.3, while the largest average increase for a class is 12.4 per cent, for trucks of 3-ton capacity. There is no prospect for a reduction in truck prices; in fact, increases in price are more likely during the early part of 1920, but it is quite possible that prices will begin to decline toward the end of 1920. Production will increase, and although 1919 was a good production year for trucks, 1920 will show an increase. The production for 1919 will probably be in the neighborhood of 307,000. For 1918 the production was 250,000, and for 1917 190,000.

Compared with That of 1919

Fuel Feed	Clutch Type	Gearset Type	Final Drive	Torque and Propulsion	Frame	Tires		Size		Wheelbase, Inches
						Front	Rear	Front	Rear	
Gravity	Cone	3 speed select.	Bevel	Springs	Pressed steel, semi-flex.	Pneumatic.	Pneumatic.	32 x 4	32 x 4	112
Gravity	Dry disk	3 speed select.	Bevel	Springs	Pressed steel, semi-flex.	Pneumatic.	Pneumatic.	31 x 4	31 x 4	124
Gravity	Dry disk	3 speed select.	Internal gear.	Springs	Pressed steel, semi-flex.	Pneumatic.	Pneumatic.	34 x 4½	34 x 4½	126
Gravity	Dry disk	3 speed select.	Internal gear.	Springs	Pressed steel, semi-flex.	Pneumatic.	Pneumatic.	32 x 4	32 x 4	117
Gravity	Dry disk	3 speed select.	Worm	Springs	Pressed steel, semi-flex.	Solid	Solid	34 x 3½	34 x 4	131
Gravity	Dry disk	3 speed select.	Worm	Springs	Pressed steel, semi-flex.	Solid	Solid	34 x 3½	34 x 4	132
Gravity	Dry disk	3 speed select.	Worm	Springs	Pressed steel, semi-flex.	Solid	Solid	36 x 3½	36 x 5	138
Gravity	Dry disk	3 speed select.	Worm	Springs	Pressed steel, semi-flex.	Solid	Solid	36 x 3½	36 x 5	139
Gravity	Dry disk	4 speed select.	Worm	Springs	Pressed steel, semi-flex.	Solid	Solid	36 x 4	36 x 7	144
Gravity	Dry disk	3 speed select.	Worm	Springs	Pressed steel, semi-flex.	Solid	Solid	36 x 4	36 x 7	147
Gravity	Dry disk	4 speed select.	Worm	Springs	Pressed steel, semi-flex.	Solid	Solid	36 x 4	36 x 7	152
Gravity	Dry disk	3 speed select.	Worm	Springs	Pressed steel, semi-flex.	Solid	Solid	36 x 4	36 x 4d	149
Gravity	Dry disk	4 speed select.	Worm	Springs	Pressed steel, semi-flex.	Solid	Solid	36 x 5	36 x 5d	164
Gravity	Dry disk	3 speed select.	Worm	Radius rods	Pressed steel, semi-flex.	Solid	Solid	36 x 5	36 x 5d	162
Gravity	Dry disk	4 speed select	Worm	Springs, radius rods.	Pressed steel, semi-flex.	Solid	Solid	36 x 6	40 x 6d	164
Gravity	Dry disk	4 speed select	Worm	Springs, radius rods.	Pressed steel, semi-flex.	Solid	Solid	36 x 6	40 x 6d	162

Detailed Technical Specifications

Details of 516 Gasoline and 22 Electric Chassis as Produced by Makes of Principal Truck Parts, Including Engines, Clutches, Electric and

Name and Model	Tons Capacity	Chassis Price	Wheelbase, Inches	FRAME			TIRES			WHEELS		ENGINE														
								Size in Ins.							COOLING						IGNITION			ELEC. SYSTEM		
															Radiator											
															CASE		CORE									
				Make	Material	Type	Kind	Front	Rear	Make	Type	Make	No. Cyl. Bore and Stroke—N.A.C.C. Hp.	Cylinders Cast	Water Circ.	Make	Type	Make	Type	Type	Make	Spark Advance	Type	Make	Extra Cost $
A. & B.	3T	3	$4,500	144	own...	rol-c..	s-flex..	sol....	48x3½d	48x3½d	Arch..	wd...	own...	4-5½x4½-42.8	2	g-p....	Bush..	sht.....	.....	fin.....	dual..	Bosch.	hand..	none..	none..	none
A. & B.	5T	5	.....	144	own...	rol-c..	s-flex..	sol....	48x3½d	48x5d	Arch..	wd...	own...	4-5½x3½-42.8	2	g-p....	Bush..	sht.....	.....	fin.....	dual..	Bosch.	hand..	none..	none..	none
Acason	R	1	2,100	142	Savg..	p-stl..	flex...	sol*..	36x3½	36x5	Bim...	wd...	Wau..	4-3½x5½-22.5	4	cent...	own...	cst.....	Can..	cel.....	sing..	Eismn.	hand..	none..	none..	none
Acason	RB	1½	2,400	142	Savg..	p-stl..	flex...	sol*..	36x3½	36x6	Bim...	wd...	Wau..	4-3½x5½-22.5	4	cent...	own...	cst.....	Can..	cel.....	sing..	Eismn.	hand..	none..	none..	none
Acason	H	2½	3,150	150	Savg..	p-stl..	flex...	sol....	36x4	36x7*	Bim...	wd...	Wau..	4-4½x5½-29.0	2	cent...	own...	cst.....	Can..	cel.....	sing..	Eismn.	hand..	none..	none..	none
Acason	L	3½	4,150	172	Savg..	p-stl..	flex...	sol....	36x5	36x5d	Bim...	wd...	Wau..	4-4½x6½-29.0	2	cent...	own...	cst.....	Can..	cel.....	sing..	Eismn.	hand..	none..	none..	none
Acason	M	5	5,150	187	Savg..	p-stl..	flex...	sol....	36x6	40x6d	Sth...	mt....	Wau..	4-4½x6½-36.2	2	cent...	own...	st.....	Can..	cel.....	sing..	Eismn.	hand..	none..	.....	.....
Ace	A	1½	.....	144	P&B..	p-stl..	flex...	sol....	34x3½	34x5	Sch...	wd...	Buda..	4-3½x5½-22.5	4	ther...	Mod..	cst.....	Mod..	.....	sing..	West..	hand..	sl&i..	West..	none
Ace	A	2½	.....	156	P&B..	p-stl..	flex...	sol*..	36x4	36x7	Day...	mt....	Buda..	4-4½x5½-29.0	4	cent...	Mod..	cst.....	Mod..	.....	sing..	West..	hand..	sl&i-2.	West..	none
Acme	B	1	2,075	130	Smith.	p-stl..	s-flex..	sol....	34x3½	34x5	Bim...	wd...	Con...	4-3½x5-22.50	4	ther...	G&O..	sht.....	G&O..	fin.....	sing..	Eismn.	hand..	lghtg..	G&D..	35
Acme	A	2	2,875	148	Smith.	p-stl..	s-flex..	sol....	36x4	36x7*	Bim...	wd...	Con...	4-4½x5½-27.2	4	cent...	own...	cst.....	G&O..	fin.....	sing..	Eismn.	hand..	lghtg..	G&D..	35
Acme	C	3½	3,875	168	Smith.	p-stl..	s-flex..	sol....	36x5	40x10*	Bim...	wd...	Con...	4-4½x5½-32.4	2	cent...	own...	cst.....	G&O..	fin.....	sing..	Eismn.	hand..	lghtg..	G&D..	35
Acme	E	5	4,975	180	Smith.	p-stl..	s-flex..	sol....	36x6	40x12*	Sth...	mt....	Con...	4-4½x6-36.2	2	cent...	own...	cst.....	G&O..	fin.....	sing..	Eismn.	hand..	lghtg..	G&D..	35
Air-O-Flex	C	1½	.....	160	P&B..	p-stl..	s-flex..	sol....	36x3½	36x5	.....	wd...	Buda..	4-3½x5½-22.5	4	pist...	Mod..	cst.....	Mod..	pln.....	dual..	Wag..	hand..	sl&i-2.	Wag..	none
All-American	A	1	1,595	130	Drt...	p-stl..	flex...	p&s....	33x4	32x4	.....	wd...	H-S..	4-3½x5-16.9	4	ther...	own...	cst.....	Stan..	cel.....	sing..	Smms*	hand..	s&l..	West..	.....
All-Power	SV4	3½	4,800	166	Prsh..	p-stl..	s-flex..	sol....	36x6	36x10	Clrk*	mt....	Con...	4-4½x5½-32.4	2	cent...	MeC..	cst.....	MeC..	fin.....	dual..	Eismn.	hand..	sl&i*..	West..	none
Apex	C	1	1,395	130	own...	rol-c..	rigid..	p&s....	33x4	32x3½	Bim...	wd...	Buda..	4-3½x5½-19.6	4	ther...	Can..	cst.....	Can..	cel.....	sing..	Aut-L.	hand..	s*l&i..	Aut-L.*	.....
Apex	D	1½	1,595	130	own...	rol-c..	rigid..	sol....	32x3½	32x4	Bim...	wd...	Buda..	4-3½x5½-19.6	4	ther...	Can..	cst.....	Can..	cel.....	sing..	Aut-L.	hand..	s&l..	Aut-L.	75
Apex	E	2½	2,450	150	own...	rol-c..	rigid..	sol....	36x4	36x6	Prud..	wd...	Buda..	4-4½x4½-29.0	4	cent...	Can..	cst.....	Can..	cel.....	sing..	Eismn.	hand..	s&l..	Eismn.	.....
Armleder	HW	2½	2,900	156	Smh..	p-stl..	s-flex..	sol....	36x4	36x4d	Crn...	wd...	Con...	4-4½x5½-27.2	4	cent...	Lng..	cst.....	Lng..	fin.....	sing..	Eismn.	hand..	none..	none..	none
Armleder	KW	3½	3,850	186	own...	rol-i..	flex...	sol....	36x5	36x5d	Crn...	wd...	Con...	4-4½x5½-32.4	2	cent...	own...	cst.....	own...	fin.....	sing..	Eismn.	dand..	none..	none..	none
Atco	W20	2	2,875	150	P&B..	p-stl..	rigid..	sol*..	36x4*	36x7*	Sth...	mt....	Buda..	4-4½x5½-29.0	4	cent...	Chgo..	cst.....	Chgo..	fin.....	sing..	Bosch.	hand..	none..	none..	none
Atterbury	7CX	2½	.....	153½	Savg..	p-stl..	flex...	sol....	36x4	36x4d	Arch..	wd...	Con...	4-4½x5½-27.2	4	cent...	own...	cst.....	Lng..	fin.....	sing..	Eismn.	fixed.	lghtg..	Vesta	.....
Atterbury	7D	3½	.....	167½	Savg..	p-stl..	flex...	sol....	36x5	40x5d	Arch..	wd...	Con...	4-4½x5½-32.4	2	cent...	own...	cst.....	Lng..	fin.....	sing..	Eismn.	hand.	lghtg..	Vesta	.....
Atterbury	8E	5	.....	167½	Savg..	p-stl..	flex...	sol....	36x5	40x6d	Day...	mt....	Con...	4-4½x6-36.2	2	cent...	own...	cst.....	Lng..	fin.....	sing..	Eismn.	hand.	s&l..	Delco.	none
Autocar	21UF	2	2,300	97	own...	rol-c..	s-flex..	sol*..	34x4	34x5	.....	wd...	own...	2-4½x4½-18.1	1	cent...	own...	sht.....	own...	fin.....	sing..	Bosch*	fixed.	9 none..	none..	none
Autocar	UG21	2	2,400	120	own...	rol-c..	s-flex..	sol*..	34x4	34x5	.....	wd...	own...	2-4½x4½-18.1	1	cent...	own...	sht.....	own...	fin.....	sing..	Bosch*	fixed.	none..	none..	none
Autohorse	10	5	2,100	43	own...	rol-c..	rigid..	sol....	34x10	..	3im...	wd...	Con...	4-3½x5-22.5	4	cent...	Eurk..	sht.....	Eurk..	cel.....	sing..	Eismn.	hand..	none..	none..	none
Available	H2	2	2,950	148	own...	rol-c..	rigid..	sol....	36x4	36x7	Sch...	wd...	Con...	4-4½x5½-27.2	4	cent...	Chgo..	cst.....	Chgo..	fin.....	sing..	Bosch.	hand..	none..	none..	none
Available	H2½	2½	3,250	148	own...	rol-c..	rigid..	sol....	36x4*	36x8	Sch...	wd...	Con...	4-4½x5½-27.2	4	cent...	Chgo..	cst.....	Chgo..	fin.....	sing..	Bosch.	hand..	none..	none..	none
Available	H3	3½	4,200	156	own...	rol-c..	rigid..	sol....	36x5	40x10*	Sch...	wd...	Con...	4-4½x5½-32.4	2	cent...	Chgo..	cst.....	Chgo..	fin.....	sing..	Bosch.	hand..	none..	none..	none
Available	H5	5	4,900	168	own...	rol-c..	rigid..	sol....	36x6	40x6d*	Sch...	wd...	Con...	4-4½x6-36.2	2	cent...	Chgo..	cst.....	Chgo..	fin.....	sing..	Bosch.	hand..	none..	none..	none
Beck	A	1	1,750	132	P&B..	.....	rigid..	sol*..	34x3½*	34x4*	Bim...	wd...	Con...	4-3½x5-19.6	4	ther...	Idl....	cst.....	Idl....	cel.....	sing..	Bosch.	fixed.	lghtg-2	Vesta	75
Beck	B	1½	1,950	144	P&B..	p-stl..	rigid..	sol*..	34x3½*	34x5*	Bim...	wd...	Con...	4-3½x5-22.5	4	ther...	Idl....	cst.....	Idl....	cel.....	sing..	Bosch.	fixed.	lghtg-2	Vesta	75
Beck	C	2	2,350	144	P&B..	p-stl..	rigid..	sol*..	36x4*	36x6*	Bim...	wd...	Con...	4-4½x5½-27.2	4	g-p..	Idl....	cst.....	Idl....	cel.....	sing..	Bosch.	fixed.	lghtg-2	Vesta	75
Belmont	AA	¾	1,150	114	Savg..	p-stl..	s-flex..	pnu....	31x4	31x4	E&O..	wd...	.....	4-3½x5-19.6	4	ther...	Chgo..	cst.....	Chgo..	fin.....	dual..	Conn..	hand..	sl&i 2.	Dneto.	none
Belmont	BB	1½	1,950	144	own...	rol-c..	s-flex..	sol*..	34x4½	36x5	E&O..	wd...	.....	4-3½x5½-22.5	4	cent...	Chgo..	cst.....	Chgo..	fin.....	sing..	Eismn.	hand..	lghtg..	Dneto.	none
Bessemer	G	1	1,600	124	Savg..	p-stl..	s-flex..	sol*..	34x3	34x4	Sch...	wd...	Con...	4-3½x5-19.6	4	ther...	Idl....	sht.....	Idl....	cel.....	sing..	Bosch.	hand..	opt..	opt..	.....
Bessemer	H-2	1½	2,085	144	P&B..	p-stl..	s-flex..	sol*..	36x3½	36x5	Sch...	wd...	Con...	4-3½x5-22.5	4	ther...	own...	cst.....	Idl*..	cel.....	sing..	Bosch.	hand..	opt..	opt..	.....
Bessemer	J-2	2½	2,785	158	P&B..	p-stl..	s-flex..	sol*..	36x4	36x4	Sch...	wd*..	Con...	4-4½x5½-27.2	4	cent...	own...	cst.....	Fed....	cel.....	sing..	Bosch.	hand..	opt..	opt..	.....
Bessemer	K-2	4	3,985	175	P&B..	p-stl..	s-flex..	sol....	36x6	36x10	Sth...	mt....	Con...	4-4½x5½-32.4	4	ther...	own...	cst.....	Stan..	cel.....	sing..	Bosch.	hand..	opt..	opt..	.....
Bethlehem	DG	1½	2,095	136	Drt...	p-stl..	s-flex..	sol....	34x3½	34x5	Way..	wd...	own...	4-4x5½-25.6	4	ther...	Fed....	cst.....	Fed....	cel.....	sing..	A-Knt	hand..	s&l-2..	G&D..	none
Bethlehem	EH	2½	2,495	144	Drt...	p-stl..	s-flex..	sol....	34x4	34x6	Way..	wd...	own...	4-4x5½-25.6	4	ther...	Fed....	cst.....	Fed....	cel.....	sing..	A-Knt	hand..	s&l-2..	G&D..	none
Bethlehem	FJ	3½	3,595	162	Drt...	p-stl..	s-flex..	sol....	34x4	34x5d	Way..	wd...	own...	4-4½x5½-32.4	4	ther...	Fed....	cst.....	Fed....	cel.....	sing..	A-Knt	hand..	s&l-2..	G&D..	none
Betz		2½	2,700	150	P&B..	p-stl..	s-flex..	sol....	36x4	36x7	Day...	mt....	Buda..	4-4½x5½-29.	4	cent...	Chgo..	cst.....	Chgo..	fin.....	sing..	Bosch.	fixed.	none..	none..	none
Bollstrom	A	5	.....	144	own...	rol-c..	flex...	sol*..	36x6	36x6	clrk...	mt....	own...	4-4½x5½-29.0	1	cent...	own...	cst.....	own...	.....	sing..	Bosch.	hand.	.....	.....	.....
Brinton	F	2½	3,000	150	own...	rol-c..	s-flex..	sol....	36x4	36x6	Sch...	wd...	Con...	4-4½x5½-27.2	4	cent...	M-R..	cst.....	M-R..	fin.....	sing..	Bosch.	hand.	none..	none..	none
Briscoe	T-34	1	1,485	121	Prsh..	p-stl..	rigid..	p&s....	33x4	34x4	Hay..	wd...	own...	4-3½x5-18.2	4	ther...	Pfx....	cst.....	Pfx....	zz-t.....	sing..	Conn..	hand.	sl&i-2.	Aut-L.	none
Brockway	S	1½	2,100	140	Prsh..	p-stl..	s-flex..	sol....	36x3½	36x5	H&D..	wd...	Con...	4-3½x5-22.5	4	ther...	Bush..	cst.....	Bush..	fin.....	sing..	Eismn.	fixed.	sl&i-2.	Dneto.	200
Brockway	K-4	2½	2,950	152	Prsh..	p-stl..	s-flex..	sol....	36x4	36x7	H&D..	wd...	Con...	4-4½x5½-27.2	4	cent...	Bush..	cst.....	Bush..	fin.....	sing..	Eismn.	hand.	sl&i-2.	Dneto.	200
Brockway	R-2	3½	3,900	164	Prsh..	p-stl..	s-flex..	sol....	36x5	36x5d	Sth...	mt....	Con...	4-4½x5½-32.4	2	cent...	Bush..	cst.....	Bush..	fin.....	sing..	Eismn.	hand.	sl&i-2.	Dneto.	200
Brockway	T-5	5	5,000	172	Prsh..	p-stl..	s-flex..	sol....	36x6	40x6d	Sth...	mt....	Con...	4-4½x6-36.2	2	cent...	Lng..	cst.....	Lng..	fin.....	sing..	Eismn.	hand.	none..	none..	.....
Champion	1200	3/5	1,000	114	.....	p-stl..	s-flex..	pnu....	32x4	32x4	.....	wd...	Lght..	4-3½x4½-16.9	4	ther...	.....	prs.....	.....	zz-t.....	sing..	A-Knt	hand.	lghg-2.	.....	none
Clydesdale	32X	1	.....	144	P&B..	p-stl..	s-flex..	sol*..	34x3½*	34x5*	.....	wd...	Con...	4-3½x5-22.5	4	ther...	own...	cst.....	own...	pln.....	sing..	Bosch.	hand.	.....	.....	.....

ABBREVIATIONS—Types of Construction

*—other options
amid—amidship
auto—automatic
bevl—bevel
cel—cellular
cent—centrifugal
chn—chain
cst—cast
ctr—center
cylinders cast, 2 in pairs
cylinders cast, 4 in block
cylinders cast, 3 in threes
cylinders cast, 1 singly
cyl-ends—cylinder-ends
d—dual
d-d—dry-disk
d-p—dry-plate
dplx—from both motor & driveshaft
d-rd—double reduction
d-s—drive-shaft
elec—electric
ext-d-s—external drive-shaft
ext-f-w—external front wheel
ext-g—external gear
ext-jst—external jack-shaft
ext-r-w—external rear wheel
fab—fabric
fin—finned tube
flex—flexible
fric—friction
g-p—gear pump
grv—gravity
gset—from gearset
hyd—hydraulic
ind-c—individual clutch
int-g—internal gear
int-g-4—internal gear drive on 4 wheels
int-r-w—internal rear wheel
jst—unit with jackshaft
l—left
l-b—loose ball
lghtg—lighting only
motr—unit with motor
mt—metal (wheels)
mtl—metal (universal joint)
opt—optional
pist—piston pump
plan—planetary
pln—plain tube
pnu—pneumatic
pres—pressure
prog—progressive
prs—pressed steel
p&s—pneumatics in front, solids in rear
p-stl—pressed steel
r—right
r&c—right & center
r-rd—radius rods
rol-c—rolled channel
rol-i—rolled I-beam
selec—selective
s-flex—semi-flexible
sht—sheet
s&l—starting & lighting
sl&i-2—starting, lighting & ignition, 2 unit
sol—solid
sprgs—springs
sq-t—square-tube
start—starting only
t-arm—torque arm
ther—thermo-syphon
t-p—two-point
t-t—torsion tube
vac—vacuum
wat-tube—water tube
wd—wood
w-d—multiple disk in oil
w-p—plate in oil
wr—wire
zz-t—zig-zag tube

ABBREVIATIONS—Makers of Parts

*Other Options
Acme—Acme Universal Joint Mfg. Co.
A-Knt—Atwater-Kent
Al-Ch—Allis-Chalmers
Aloy—Alloy Steel Spring
Amer—American Magneto Co.
Arch—Archibald
Arvac—Arvac Co.
Aut-L—Auto-Lite
Auto—Auto-Wheel Co.
A-W-W—Automotive Wire Wheel Co.
B&B—Ball & Ball
B-Beck—Borg & Beck
Berlg—Berling
Bet—Betts Spring Co.
Bim—Bimel
B-Lipe—Brown-Lipe
Blood—Blood Bros.
Brem—Bremer
Bvr—Beaver Mfg. Co.
B&W—B & W Mfg. Co.
Can—Candler Radiator
Cant—Canton-Cleveland
Carl—Carleton Co.
Cart—Carter Carburetor
Cas—G. M. Castle
CAS—C. A. S. Products
Chgo—Chicago Mfg. Co.
Chic—Chicago-Standard
Chmp—Champion Auto Spring Co.
Chy—Cheney
Clrk—Clark Equipment
Col—Columbia Axle Co.
Con—Continental Motor
Conn—Connecticut
Crn—Crane & Mac-Mahon Co.
C-S—Christopher Simpson Iron Co.
Day—Dayton
Del—Delaney
Detlaf—Detlaff

# of Gasoline Motor Trucks for 1920

208 American Manufacturers—Full Particulars of Types and Gearsets, Rear Axles, Steering Gears, Governors and Also Fuel Systems

ENGINE									TRANSMISSION											BRAKES		CONTROL			UNIVERSALS		
GOVERNOR			SPEED		FUEL SYS.		CLUTCH		GEARSET				FINAL DRIVE									STEERING GEAR				
Type	Make	Drive	Motor in r.p.m.	Truck in m.p.h.	Carbureter Make	Fuel Feed	Type	Make	Type	Make	Placed	Speeds	Type	Rear Axle Make	Total Gear Reduction	Propulsion Taken By	Torque Taken By	Springs Make	Foot	Hand	Placed	Make	Levers	Type	Make	Name and Model
none.	none...	.....	.....	.....	Schblr..	grv...	none...	none...	elec....	none...	amid..	2	int-g-f.	own	.....	r-rd...	r-rd...	S-P...	ext-r-w..	ext-f-w	r...	Gem..	r...	mtl..	Franck	A. & B.....3T
none.	none...	.....	.....	.....	Schblr..	grv...	none...	none...	elec....	none...	amid..	2	int-g-f.	own	.....	r-rd...	r-rd...	S-P...	ext-r-w..	ext-f-w	r...	Gem..	r...	mtl..	Franck	A. & B.....5T
cent.	Wau...	motor	.....	.....	Schblr..	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	worm.	Timkn.	8.25	sprgs..	sprgs..	.....	int-r-w..	int-r-w	.....	Ross..	ctr..	mtl..	Blood..	Acason.....R
cent.	Wau...	motor	.....	.....	Schblr..	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	worm.	Timkn.	9.25	sprgs..	sprgs..	.....	int-r-w..	int-r-w	.....	Ross..	tr..	mtl..	Blood..	Acason.....RB
cent.	Wau...	motor	.....	.....	Schblr..	vac...	d-d...	B-Beck.	ind-c...	Cotta..	motr..	3	worm.	Timkn.	8.50	sprgs..	sprgs..	.....	int-r-w..	int-r-w	r...	Ross..	ctr..	mtl..	Blood..	Acason.....H
cent.	Wau...	motor	.....	.....	Schblr..	vac...	d-d...	B-Beck.	ind-c...	Cotta..	motr..	3	worm.	Timkn.	10.33	sprgs..	sprgs..	.....	int-r-w..	int-r-w	.....	Ross..	ctr..	mtl..	Blood..	Acason.....L
cent.	Wau...	motor	.....	.....	Schblr..	vac...	d-p...	B-Beck.	ind-c...	Cotta..	motr..	3	worm.	Timkn.	10.25	sprgs..	sprgs..	.....	int-r-w..	int-r-w	.....	Ross..	ctr..	mtl..	Blood..	Acason.....M
cent.	Pierce..	motor	1200	17	Schblr..	grv...	d-d...	M & E.	selec...	Cotta..	amid..	3	worm.	Timkn.	7.00	sprgs..	sprgs.	Mth..	int-r-w..	int-r-w	l...	Ross..	ctr..	mtl..	Spicer..	Ace.....A
cent.	Pierce..	motor	1000	14	Schblr..	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	7.75	sprgs..	sprgs.	Mth..	int-r-w..	int-r-w	l...	Ross..	ctr..	mtl..	Spicer..	Ace.....A
cent.	Dplx...	gearst	1700	22	Rayfld.	vac...	d-p...	B-Beck.	ind-c...	Cotta..	motr..	3	worm.	Timkn.	7.75	sprgs..	sprgs.	Dtr...	int-r-w..	int-r-w	l...	Ross..	ctr..	mtl..	Blood..	Acme.....B
cent.	Dplx...	gearst	1500	17	Rayfld.	vac...	d-p...	B-Beck.	ind-c...	Cotta..	motr..	4	worm.	Timkn.	8.50	sprgs..	sprgs.	Dtr...	int-r-w..	int-r-w	l...	Ross..	ctr..	mtl..	Blood..	Acme.....A
cent.	Dplx...	gearst	1200	13	Rayfld.	vac...	d-p...	B-Beck.	ind-c...	Cotta..	amid..	4	worm.	Timkn.	12.00	r-rd...	sprgs..	Dtr...	int-r-w..	int-r-w	l...	Ross..	ctr..	mtl..	Blood..	Acme.....C
l-b...	Con...	motor	1250	13	Rayfld.	vac...	d-p...	B-Beck.	ind-c...	Cotta..	amid..	4	worm.	Timkn.	11.67	r-rd...	sprgs.	Dtr...	int-r-w..	int-r-w	l...	Ross..	ctr..	mtl..	Blood..	Acme.....E
suct..	Phro...	motor	1800	28	Stmbg.	grv...	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	int-g..	Russl.	5.46	r-rd...	r-rd...	.....	int-r-w..	ext-r-w	l...	Ross..	ctr..	fab..	Therm.	Air-O-Flex.....C
.....	.....	.....	2500	25	Stmbg.	grv...	d-p...	B-Beck.	selec...	G-Lees.	motr..	3	int-g..	Torbn..	6.50	sprgs..	sprgs.	Dtr...	ext-r-w..	int-r-w	l...	Ross..	ctr..	mtl..	Univl..	All-American.....A
suct..	Phro...	motor	1500	23	Zenith.	grv...	d-d...	Detlaf..	ind-c...	Cotta..	motr..	3	worm.	Timkn.	.....	sprgs..	sprgs..	Tuth..	ext-r-w..	int-r-w	l...	Ross..	ctr..	mtl..	Unvsl..	All-Power.....SV4
none.	none...	.....	.....	35	Stmbg.	vac...	d-d...	Fuller..	selec...	Fuller..	motr..	3	int-g..	Torbn..	6.50	sprgs..	sprgs.	Dtr...	ext-r-w..	int-r-w	l...	Lavn..	ctr..	mtl..	Univl..	Apex.....C
none.	none...	.....	.....	.....	Stmbg.	vac...	d-d...	Fuller..	selec...	Fuller..	motr..	3	int-g..	Torbn..	8.00	sprgs..	sprgs.	Dtr...	ext-r-w..	int-r-w	l...	Lavn..	ctr..	mtl..	Univl..	Apex.....D
cent.	Dplx...	motor	1177	14	Stmbg.	vac...	d-d...	Fuller..	selec...	Fuller..	motr..	3	int-g..	Torbn.	9.00	sprgs..	sprgs.	Dtr...	ext-r-w..	int-r-w	l...	Lavn..	ctr..	mtl..	Univl..	Apex.....E
cent.	Pierce..	motor	1100	16	Schblr..	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	3	worm.	Timkn.	8.75	r-rd...	sprgs..	Mth..	int-r-w..	int-r-w	l...	Ross..	ctr..	mtl..	Spicer*	Armleder.....HW
cent.	Pierce..	motor	1100	14	Schblr..	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	3	worm.	Timkn.	8.75	r-rd...	sprgs..	Mth..	int-d-s..	int-r-w	l...	Ross..	ctr..	mtl..	Spicer*	Armeder.....KW
cent.	Pierce..	motor	1150	16	Stmbg.	vac...	d-d...	Fuller..	selec...	Fuller..	amid..	4	worm.	Wis ...	7.75	sprgs..	sprgs.	Shel...	int-r-w..	int-r-w	l...	Ross..	ctr..	mtl..	Hart...	Atco.....W20
suct..	Mnsch.	motor	1300	15	Zenith.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	4	worm.	Timkn.	9.25	sprgs..	sprgs.	Sp-P..	int-r-w..	int-r-w	r...	Gem..	r...	mtl..	Spicer..	Atterbury.....7CX
suct..	Mnsch.	motor	1200	13	Zenith.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	4	worm.	Timkn.	10.33	sprgs..	.....	Sp-P..	int-r-w..	int-r-w	r...	Gem..	r...	mtl..	Spicer..	Atterbury.....7D
cent.	Con....	motor	1150	11	Zenith.	vac...	d-d...	B-Lipe.	selec...	B-Lipe.	amid.	4	worm.	Timkn.	11.60	r-rd...	.....	Sp-P..	int.....	int.....	l...	Gem..	ctr..	mtl..	Spicer..	Atterbury.....8E
none.	none...	none..	.....	20	Stmbg.	grv...	d-p...	own....	prog...	own....	amid..	3	d-rd...	own....	8.30	sprgs..	sprgs.	.....	ext-r-w..	int-r-w	r...	own...	r...	mtl..	.....	Autocar.....21UF
none.	none...	none..	.....	20	Stmbg.	grv...	d-p...	own....	prog...	own....	amid..	3	d-rd...	own....	8.30	sprgs..	sprgs.	.....	ext-r-w..	int-r-w	r...	own...	r...	mtl..	.....	Autocar.....UG21
none.	none...	none..	1200	15	Stmbg.	grv...	d-p...	B-Beck.	selec...	Detrt..	amid..	3	int-g..	own....	11.41	tor-a..	tor-a..	Chmp	ext-d-s..	int-f-w	..c...	own..	r...	.....	.....	Autohorse.....10
none.	none...	none..	940	13	Stmbg	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Wis*...	7.75	r-rd...	sprgs..	Tuth..	int-r-w..	int-r-w	l...	Ross*.	ctr..	mtl*.	Spicer*	Available.....H2
cent.	Pierce..	motor	1051	13	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Wis*...	8.66	r-rd...	sprgs..	Tuth..	int-r-w..	int-r-w	l...	Ross*.	ctr..	mtl*.	Spicer*	Available.....H2½
cent.	Pierce..	motor	924	9	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Wis*...	10.66	r-rd...	sprgs..	Tuth..	int-r-w..	int-r-w	l...	Ross*.	ctr..	mtl*.	Spicer*	Available.....H3
cent.	Con....	motor	881	9	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	11.66	r-rd...	sprgs..	Tuth..	int-r-w..	int-r-w	l...	Ross..	ctr..	mtl*.	Spicer*	Available.....H5
cent.	Pierce..	motor	.....	.....	Stmbg.	grv...	d-d...	Fuller..	selec...	.....	motr..	3	int-g..	Clrk...	6.50	sprgs..	sprgs..	Hig...	ext-r-w..	int-r-w	l...	Lavn..	ctr..	fab..	Blood..	Beck.....A
cent.	Pierce.	motor	.....	.....	Stmbg.	grv...	d-d...	Fuller..	selec...	.....	motr..	3	int-g..	Clrk...	8.00	sprgs..	sprgs..	Hig...	ext-r-w..	int-r-w	l...	Lavn..	ctr..	mtl..	Blood..	Beck.....B
cent.	Pierce.	d-s...	.....	.....	Stmbg.	grv...	d-d...	Fuller..	selec...	.....	motr..	3	int-g..	Clrk...	9.00	sprgs..	sprgs..	Hig...	ext-r-w..	int-r-w	l...	Lavn..	ctr..	mtl..	Blood..	Beck.....C
cent.	Pierce..	motor	1050	18	Zenith.	grv...	W-P...	G-Lees.	selec...	G-Lees.	motr..	3	int-g..	Clrk...	5.25	sprgs..	sprgs..	Mth..	ext-r-w..	int-r-w	l...	Lavn..	ctr.	mtl..	Sterl..	Belmont.....AA
cent.	Pierce..	motor	1050	16	Zenith.	vac...	W-P...	G-Lees.	selec...	G-Lees.	motr..	3	int-g..	Clrk...	7.00	sprgs..	sprgs..	Mth..	ext-r-w..	int-r-w	l...	Lavn..	ctr.	mtl..	Sterl..	Belmont.....BB
none.	none...	none.	1450	20	Zenith.	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	int-g..	Torbn..	7.00	sprgs..	sprgs..	S-P...	ext-r-w..	int-r-w	l...	Ross..	ctr..	mtl..	Arvac..	Bessemer.....G
cent.	Pierce..	motor	1400	17	Zenith.	grv...	d-p...	B-Beck.	selec...	B-Lipe.	amid..	3	int-g..	Torbn..	8.00	r-rd...	sprgs..	S-P...	ext-r-w..	int-r-w	l...	Ross..	ctr..	mtl..	Arvac..	Bessemer.....H-2
cent.	Pierce..	motor	1400	14	Zenith.	grv...	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	int-g..	Torbn..	8.00	r-rd...	sprgs..	S-P...	ext-r-w..	int-r-w	l...	Ross..	ctr..	mtl..	Arvac..	Bessemer.....J-2
cent.	Pierce..	motor	1250	12	Zenith.	grv...	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	int-g..	Torbn..	10.25	r-rd...	sprgs..	S-P...	int-r-w..	ext-d-s	l...	Ross..	ctr..	mtl..	Spicer	Bessemer.....K-2
cent.	Pierce..	motor	1358	18	Stmbg.	grv...	d-p...	B-Beck.	selec...	Detrt..	motr..	3	int-g..	Russel.	8.20	sprgs..	sprgs..	Shel...	ext-r-w..	int-r-w	l...	Lavn..	ctr..	mtl..	Univl..	Bethlehem.....DG
cent.	Pierce..	motor	1303	15	Stmbg.	grv...	d-p...	B-Beck.	selec...	Detrt..	motr..	3	int-g..	Russel.	10.02	sprgs..	sprgs..	Shel...	ext-r-w..	int-r-w	l...	Lavn..	ctr..	mtl..	Univl..	Bethlehem.....EH
cent.	Pierce..	motor	1113	12	Stmbg.	grv...	d-p...	B-Beck.	selec...	Detrt..	motr..	3	int-g..	Russel.	9.40	sprgs..	sprgs..	Shel...	ext-r-w..	int-r-w	l...	Lavn..	ctr..	mtl..	Spicer..	Bethlehem.....FJ
cent.	Pierce..	motor	1100	15	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	4	worm.	Timkn.	8.50	sprgs..	sprgs..	Tuth..	int-r-w..	int-r-w	l...	Ross..	ctr..	mtl..	Univl..	Betz.....
cent.	.....	motor	1000	12	Stmbg.	grv...	d-d...	.....	ind-c...	own...	amid.	4	int-g..	own....	.....	sprgs..	sprgs..	.....	ext-d-s.	ext-w4	l...	Gem..	ctr..	mtl..	own...	Bollstrom.....A
cent.	Pierce..	motor	1000	18	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	3	worm.	Timkn.	.....	r-rd...	t-arm.	Phila..	int-r-w..	int-r-w	l...	Ross.	l&c.	mtl..	Spicer..	Brinton.....F
none.	none...	none..	2400	25	Buick..	grv...	cone..	own...	selec...	own...	motr..	3	int-g..	Russel.	8.20	sprgs..	sprgs.	Aloy...	ext-r-w..	int-r-w	l...	Lavn..	ctr..	mtl..	Unvsl..	Briscoe.....T-34
none.	none...	.....	1300	18	Schblr..	vac...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	3	worm.	Shel....	7.80	r-rd...	sprgs..	Merl..	int-r-w..	int-r-w	l...	Gem..	ctr..	mtl..	Spicer..	Brockway.....S
none.	none...	.....	1200	15	Schblr..	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	8.50	r-rd...	sprgs..	Merl..	int-r-w..	int-r-w	l...	Gem..	ctr..	mtl..	Spicer..	Brockway.....K-4
none.	none...	.....	1200	12	Schblr..	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	10.33	r-rd...	sprgs..	Merl..	int-r-w..	int-r-w	l...	Gem..	ctr..	mtl..	Spicer..	Brockway.....R-2
l-b...	Con....	motor	1200	12	Schblr..	vac...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	11.66	r-rd...	sprgs..	Merl.	int-r-w..	int-r-w	l...	Gem..	ctr..	mtl..	Spicer..	Brockway.....T-5
none.	none...	.....	.....	.....	.....	grv...	d-p...	.....	selec...	.....	motr..	3	bevel..	.....	5.25	sprgs..	sprgs..	.....	ext-r-w..	int-r-w	l...	.....	ctr..	mtl..	.....	Champion.....1200
cent.	own....	motor	1200	17	Zenith.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	3	worm.	S.P....	7.25	r-rd...	sprgs..	S-P...	int-r-w..	int-r-w	l...	Ross.	ctr..	mtl..	Spicer..	Clydesdale.....32X

ABBREVIATIONS—Makers of Parts—(Continued)—

Detrt—Detroit G. & M.
Ditw—Ditwiler Mfg. Co.
Dneto—Dyneto
Drt—Detroit Pressed Steel Co.
Dtr—Detroit Products
Dtrt—Detroit Lubricator
Dun—Dunbar Mfg. Co.
Dur—Durston Gear Corp.
E&M—English & Mersick
E&O—Eberly & Orris
Eismn—Eisemann
Ens—Ensign Carburetor
Eric—Ericsson Mfg. Co.
Eurk—Eureka
F&H—French & Hecht
FAC—F. A. Chapper
Fed—Fedders
Flx—Flexo Mfg. Co.
Frank—Francke Co.
G&D—Gray & Davis
G&O—G & O Mfg. Co.
GCS—Garden City Springs
Gem—Gemmer
G-Lees—Grant-Lees
Grn—Greens Car Wheel
H&D—Hoopes Bros. & Darlington
Har—Harrison
Hart—Hartford
Harv—Harvey
Hay—Hayes Wheel Co.
Her—Hercules
Hig—Higgins
Hink—Hinkley
Hol—Holley
H-Shaw—Hele-Shaw
H-S—Herschell-Spillman
Hyd—Hydraulic
Idl—Ideal
Ind—Indestructible
Iron—Iron City
Jacox—Jackson-Church-Wilcox
Jck—Jackson Auto
Jns—Phineas Jones & Co.
John—Johnson Co.
Kal—Kalamazoo
Kel—Kelsey Wheel Co.
Ken—Kenosha Wheel & Knz—Kuntz
Lavn—Lavine
LeR—Le Roi
Lght—Light Mfg. Co.
L-N—Leece-Neville Co.
Lng—Long
Lvgn—Livingston
Lyc—Lycoming
Marvl—Marvel
Mas—F. C. Mason & Co.
Mast—Master
McCn—McCanna
M&E—Merchant & Evans
McC—McCord
Mech—Mechanics Mach. Co.
Merl—Merrill Spring Co.
Miller—H. A. Miller
Mnrch—Monarch
Mod—Modine Mfg. Co.
Mot—Mott Wheel Wks.
M-R—Marlin-Rockwell
MSC—Massillon
Mth—Mather
Mut—Mutual Wheel Co.
Nat—National Spring
Natl—National Can Co.
N-E—North East
Nich—Nichols Elec. Co.
P&B—Parish & Bingham
Perk—Perkins
Pet—Peters Mach. Co.
Pfx—Perfex Radiator
Phil—Philadelphia
Phro—Pharo Mfg. Co.
Prsh—Parish Mfg. Co.
Prud—Prudden
Rayfld—Rayfield
Rem—Remy
Rowl—Wm. H. Rowland
Roy—Royer Wheel Co.
R-T—Rome-Turney
Rugl—Ruggles
Rus—Russel Car & Frdy.
Russl—Russel Axle Co.
Rut—Rutenber
R&V—Root & VanDervoort
Sag—Saginaw
Sal—Salisbury
Savg—Savage Arms
Sch—Schwarz Wheel Co.
Schblr—Schebler
Shel—Sheldon
Simp—Simplex
S-J—Shotwell-Johnson
S-M—Standard Malle-
Smh—A. O. Smith
Sth—Smith Steel Wheel
S-P—Standard Parts Co.
Spltf—Splitdorf
Sp-P—Spring Perch Co.
Stan—Standard Radiator
Stand—Standard Steel Spring Co.
Sterl—Sterling Bearings
Stmbg—Stromberg
Stn—Standard Wheel Co.
S-W—Sparks-Withington
Sum—Sumter Elec. Co.
Therm—Thermoid
Timkn—Timken
Torbn—Torbensen
Tuth—Tuthill
Univl—Universal Prdts.
Unv—Universal
Unvsl—Universal Mach.
U. S.—U. S. Spring Co.
Wag—Wagner
Warn—Warner
Wau—Waukesha
West—Westinghouse
Wil-B—Wilcox Bennett
Wis—Wisconsin Parts
W-L—Ward-Leonard
W&L—Waterhouse & Lester Co.
Way—Wayne Wheel Co.
Wol—Wohlrab
Wsc—Wisconsin
Yng—Youngstown Pressed Steel Co.

Detailed Technical Specifications of

Name and Model	Tons Capacity	Chassis Price	Wheelbase, Inches	FRAME			TIRES			WHEELS		ENGINE														
								Size in Ins.							COOLING					IGNITION			ELEC. SYSTEM		
																Radiator									
																CASE		CORE							
				Make	Material	Type	Kind	Front	Rear	Make	Type	Make	No. Cyl Bore and Stroke—N.A.C.C. Hp.	Cylinders Cast	Water Circ.	Make	Type	Make	Type	Type	Make	Spark Advance	Type	Make	Extra Coal $
Clydesdale	42	1½	$2,445	146	P&B	p-stl	s-flex	sol*	36x3½*	36x6*			wd	Con	4-3½x5-22.5	4	ther	own	cst	own	pln	sing	Bosch	hand			
Clydesdale	65X	2½	3,200	163	P&B	p-stl	s-flex	sol*	36x4*	36x8*	Sth	nt	Con	4-4½x5½-27.2	2	cent	own	cst	own	pln	sing	Bosch	hand			
Clydesdale	90	3½	4,075	180	P&B	p-stl	s-flex	sol	36x5	40x10	Sth	nt	Con	4-4½x5½-32.4	2	cent	own	cst	own	pln	sing	Bosch	hand			
Clydesdale	120B	5	5,025	176	P&B	p-stl	s-flex	sol	36x6	40x12	Sth	mt	Con	4-4½x6-36.11	2	cent	own	cst	own	pln	sing	Bosch	hand			
Collier	18	1		140		p-stl		sol	34x4	34x5*			Con	4-3½x5-19.6	4	cent	Lng					Eismn				
Collier	19	1½		144		rol-c		sol	36x4	36x6*			Con	4-3½x5-22.5	4	cent						Eismn				
Collier	20	2		152		rol-c		sol	36x4	36x7			Con	4-4½x5½-27.2	4	cent						Eismn				
Columbia	F	1	1,750	126	own	rol-c	flex	sol	34x3½	34x4	Crn	wd	Con	4-3½x5-22.5	4	cent	Lng	cst	Lng	fin	sing	Bosch	hand	none	none	none
Columbia	G	2½	2,750	144	own	rol-c	s-flex	sol*	36x4	36x7	Crn	wd	Hink	4-4x5½-25.6	4	cent	Lng	cst	Lng	fin	sing	Bosch	hand	s&l-2	Remy	125
Commerce	E	1	1,590	126	Drt	p-stl	flex	sol*	34x3*	34x4*	Bim	wd	Con	4-3½x5-22.5	4	ther	Lng	cst	Lng	fin	sing	Eismn	fixed	s&l	Bijur	none
Commerce	EP	1½	1,965	134	Drt	p-stl	flex	pnu	36x6	36x6	Bim	wd	Con	4-3½x5-22.5	4	ther	Lng	cst	Lng	fin	sing	Eismn	fixed	s&l	Bijur	none
Concord	A	1½	2,350	140	P&B	p-stl	s-flex	sol	36x3½	36x5	Crn	wd	Buda	4-3½x5½-22.5	4	cent	Bush	cst	Bush	fin	sing	Eismn	hand			
Concord	B	2½	2,850	150	P&B	p-stl	s-flex	sol	36x4	36x4d	Crn	wd	Buda	4-4½x5½-29.0	4	cent	Bush	cst	Bush	fin	sing	Eismn	hand			
Conestoga	12	¼		124	Savg	p-stl		pnu	32x4½	32x4½	E&O	wd	Con	4-3½x5-19.6	4	ther				cel	sing	Simms	hand	s&l		none
Conestoga	20	1	2,100	128	own	rol-c		sol*	34x3½*	34x5*	E&O	wd	Con	4-3½x5-19.6	4	ther	own	cst	E&M	fin	sing	Simms	hand			
Conestoga	30	2	2,700	138	own	rol-c	rigid	sol	36x4	36x4d	E&O	wd	Con	4-3½x5-22.5	4	ther	own	cst	E&M	fin	sing	Simms	hand			
Corbitt	E	1	2,200	130	own	rol-c	flex	sol	34x3½	34x4	Bim	wd	Con	4-3½x5-22.5	4	ther	McC	cst	McC	fin	sing	Eismn	hand	none	none	
Corbitt	D	1½	2,600	130	own	rol-c	flex	sol	36x3½	36x5	Bim	wd	Con	4-3½x5-22.5	4	ther	McC	cst	McC	fin	sing	Eismn	hand	none	none	
Corbitt	C	2	3,250	148	own	rol-c		sol	36x3½	36x7	Bim	wd	Con	4-4½x5½-27.2	4	cent	McC	cst	McC	fin	sing	Eismn	hand	none	none	
Corbitt	B	2½	3,500	148	own	rol-c	s-flex	sol	36x4	36x7	Bim	wd	Con	4-4½x5½-27.2	4	cent	McC	cst	McC	fin	sing	Eismn	hand	none	none	
Corbitt	A	3½	4,200	178	own	rol-c	s-flex	sol	36x5	36x10	Sth	mt	Con	4-4½x5½-32.4	2	cent	McC	cst	McC	fin	sing	Eismn	hand	none	none	
Corbitt	AA	5	5,000	178	own	rol-c	s-flex	sol	36x6	40x12	Sth	mt	Con	4-4½x6-36.2	2	cent	McC	cst	McC	fin	sing	Eismn	hand	none	none	
Day-Elder	A	1	1,925	128	Savg	p-stl	s-flex	sol	34x3	34x4	Jns	wd	Con	4-3½x5-22.5	4	ther	Bush	cst	Bush	fin	sing	Eismn	fixed	s&l	Eismn	150
Day-Elder	B	1½	2,200	144	Savg	p-stl	s-flex	sol	34x3½	34x5	Jns	wd	Con	4-3½x5-22.5	4	ther	Bush	cst	Bush	fin	sing	Eismn	fixed	s&l	Eismn	150
Day-Elder	D	2	2,600	144	Savg	p-stl	s-flex	sol	36x7	36x6	Jns	wd	Con	4-4½x5½-27.2	4	cent	Bush	cst	Bush	fin	sing	Eismn	fixed	s&l	Eismn	150
Day-Elder	C	2½	2,850	150	Savg	p-stl	s-flex	sol	36x4	36x7	Jns	wd	Buda	4-4½x5½-29.0	4	cent	Bush	cst	Bush	fin	sing	Eismn	fixed	lghtg	Eismn	100
Day-Elder	F	3½	3,550	165	Savg	p-stl	s-flex	sol	36x5	36x5d	Jns	wd	Con	4-4½x5½-32.4	2	cent	Bush	cst	Bush	fin	sing	Eismn	fixed	lghtg	Eismn	100
Day-Elder	E	5	4,500	150	Savg	p-stl	s-flex	sol	36x5	40x6d	Jns	wd	Buda	4-4½x6-32.4	2	cent	Bush	cst	Bush	fin	sing	Berlg	fixed	lghtg	Eismn	100
Dearborn	F	1½	1,980	126	own	rol-c	s-flex	sol*	34x4*	34x5*			wd	Con	4-3½x5-19.6	4	ther		cst		fin	sing	Bosch	hand			
Dearborn	BW	2	2,250	133	own	rol-c	s-flex	sol	34x4	34x5			wd	Buda	4-3½x5½-22.5	4	ther	Chgo	cst	Chgo	fin	sing	Bosch	hand			
Defiance	D	1½		140	Drt	p-stl	s-flex	pnu	35x5	36x6	Crn	wd	Con	4-3½x5-22.5	4	cent	Pfx	cst	Pfx	cel	sing		hand	s&l-2		none
Defiance	E	2		140	Drt	p-stl	s-flex	pnu	35x5	38x7	Crn	wd	Con	4-3½x5-22.5	4	cent	Pfx	cst	Pfx	cel	sing		hand	s&l-2		none
DeKalb	E2	2	2,250	134	Prsh	p-stl	flex	sol*	34x3½*	36x5*	Sch	wd	Con	4-4½x5½-27.2	4	cent	Jck	sht	Jck	pln	sing	Eismn	hand	none	none	
DeKalb	E2½	2½	2,600	136	Prsh	p-stl	flex	sol*	36x4*	36x6*	Sch	wd	Con	4-4½x5½-27.2	4	cent	Jck	sht	Jck	pln	sing	Eismn	hand	none	none	
Denby	12	1	1,950	124	Drt	p-stl	s-flex	pnu	35x5	36x6			wd	Con	4-3½x5-19.6	4	ther	Lng	cst	Lng	pln	sing	Eismn	fixed	none	none	
Denby	134	2	2,450	144	Drt	p-stl	s-flex	sol	36x3½	36x6			wd	Con	4-3½x5-22.5	4	ther	Lng	cst	Lng	pln	sing	Eismn	fixed	none	none	
Denby	25	3	3,250	150	Drt	p-stl	s-flex	sol	36x4	36x7			mt	Con	4-4½x5½-27.2	4	cent	Lng	cst	Lng	pln	sing	Eismn	hand	none	none	
Denby	210	5	4,900	170	Drt	p-stl	s-flex	sol	35x6	40x12			mt	Con	4-4½x5½-32.4	2	cent	Lng	cst	Lng	pln	sing	Eismn	hand	none	none	
Diamond-T	T	1½	2,220	144	Smh	p-stl		sol	36x3½	36x5			wd		4-3½x5½-22.5	4	cent		cst	G&O	fin	sing	Bosch	fixed			
Diamond-T	FS	1½	2,445	144	Smh	p-stl		sol	36x3½	36x5			wd		4-3½x5½-22.5	4	cent		cst	G&O	fin	sing	Bosch	fixed			
Diamond-T	J4	1½	2,755	154	Smh	p-stl		sol	36x3½	36x5			wd	Con	4-3½x5-22.5	4	ther		cst	G&O	fin	sing	Bosch	fixed			
Diamond-T	J3	2	3,185	154	Smh	p-stl		sol	36x4	36x7			wd	Con	4-4½x5½-27.2	4	cent		cst	G&O	fin	sing	Bosch	fixed			
Diamond-T	LB	3½	4,390	170	Smh	p-stl		sol	36x5	36x5d			wd	Con	4-4½x5½-32.4	2	cent		cst	G&O	fin	sing	Bosch	hand			
Diamond-T	R	5	5,190	170	Smh	p-stl		sol	36x6	40x6d			wd	Con	4-4½x5½-32.4	2	cent		cst	G&O	fin	sing	Bosch	hand			
Diamond-T	S	5	5,660	180	Smh	p-stl		sol	36x6	40x6d			wd	own	4-4½x6-36.2	2	cent		cst	G&O	fin	sing	Bosch	hand			
Derris	K-4	2½	3,285	144	Smh	p-stl	s-flex	sol*	36x4*	36x8*	Sth	mt	own	4-4½x5½-29.0	4	cent	own	cst	McC	fin	sing	Bosch	hand	s&l-2	West	175
Derris	K-7	3½	4,200	154	Smh	p-stl	s-flex	sol*	36x5*	36x10*	Sth	mt	own	4-4½x5½-29.0	4	cent	own	cst	McC	fin	sing	Bosch	hand	s&l-2	West	175
Douglas	C	1	1,000	120	own	rol-c		sol*	34x5	35x5	own	wd	Buda	4-3½x5½-22.0	4	cent	own	cst		fin	sing	Eismn	hand			
Douglas	E	2½	2,525	136	own	rol-c		sol*	34x4	36x7	own	wd	Buda	4-4½x5½-29.0	4	cent	own	cst		fin	sing	Eismn	hand			
Duplex	E	3½	4,000	130	P&B	p-stl	rigid	sol	36x6	36x6	Prud	wd	Buda	4-4½x5½-29.0	4	cent	Lng	prs	Lng	fin	sing	Eismn	hand	opt	opt	
Economy	T-LHD	¾	1,250	128		p-stl	s-flex	pnu	35x5	35x5	Auto	wd	own	4-3¼x5½-21.2	4	cent	own	prs	own	cel	dual	Aut-L	hand	s&i	Aut-L	none
Elmira	C	½	500	104	own	rol-c	s-flex	pnu	28x3	28x3	Mot	wr	Perk	4-3½x4-15.6	4	ther	Bush	prs	Bush	cel	sing	A-Knt	hand	lghtg	Carl	65
Erie		1½		144		p-stl		sol	34x3½	36x5			Buda	4-3½x5-27.2	1					fin		Bosch		opt		150
Erie		2		150		p-stl		sol	34x3½	36x5			Buda	4-4½x5½-27.2	1					fin		Bosch				
Erie		2½		150		p-stl		sol	34x4	36x5			Buda	4-4½x5½-27.2	1					fin		Bosch				
Erie		3½		168		p-stl		sol	36x5	40x5d			Buda	4-4½x5½-32.4	2					fin		Bosch				
Fageol		2½	3,400	144	own	rol-c		sol	34x4	36x7	Prud	wd	Wau	4-4½x5½-29.0	2	cent	own	cst	Mod	zz-t	sing	Splf	hand			
Fageol		3½	4,500	172	own	p-stl	flex	sol	36x5	36x5d	Prud*	wd*	Wau	4-	2	cent	own	cst	Mod	zz-t	sing	Splf	hand			
Fageol		5	5,300	172	own	p-stl		sol	36x6	40x6d	Prud*	wd*	Wau	4-4½x6½-32.4	2	cent	own	cst	Mod	zz-t	sing	Splf	hand			

ABBREVIATIONS—Types of Construction

***—other options**
amid—amidship
auto—automatic
bevl—bevel
cel—cellular
cent—centrifugal
chn—chain
cst—cast
ctr—center
cylinders cast, 2 in pairs
cylinders cast, 4 in block
cylinders cast, 3 in threes
cylinders cast, 1 singly
cyl-ends—cylinder-ends
d—dual
d-d—dry-disk
d-p—dry-plate
dplx—from both motor & driveshaft
d-rd—double reduction
d-s—drive-shaft
elec—electric
ext-d-s—external drive-shaft
ext-f-w—external front wheel
ext-g—external gear
ext-jst—external jack-shaft
ext-r-w—external rear wheel
fab—fabric
fin—finned tube
flex—flexible
fric—friction
g-p—gear pump
grv—gravity
gset—from gearset
hyd—hydraulic
ind-c—individual clutch
int-g—internal gear
int-g-4—internal gear drive on 4 wheels
int-r-w—internal rear wheel
jst—unit with jackshaft
l—left
l-b—loose ball
lghtg—lighting only
motr—unit with motor
mt—metal (wheels)
mtl—metal (universal joint)
opt—optional
pist—piston pump
plan—planetary
pln—plain tube
pnu—pneumatic
pres—pressure
prog—progressive
prs—pressed steel
p&s—pneumatics in front, solids in rear
p-stl—pressed steel
r—right
r&c—right & center
r-rd—radius rods
rol-c—rolled channel
rol-i—rolled I-beam
selec—selective
s-flex—semi-flexible
sht—sheet
s&l—starting & lighting
sl&i-2—starting, lighting & ignition, 2 unit
sol—solid
sprgs—springs
sq-t—square-tube
start—starting only
t-arm—torque arm
ther—thermo-syphon
t-p—two-point
t-t—torsion tube
vac—vacuum
wat-tube—water tube
wd—wood
w-d—multiple disk in oil
w-p—plate in oil
wr—wire
zz-t—zig-zag tube

ABBREVIATIONS—Makers of Parts

*Other Options
Acme—Acme Universal Joint Mfg. Co.
A-Knt—Atwater-Kent
Al-Ch—Allis-Chalmers
Aloy—Alloy Steel Spring
Amer—American Magneto Co.
Arch—Archibald
Arvac—Arvac Co.
Aut-L—Auto-Lite
Auto—Auto-Wheel Co.
A-W-W—Automotive Wire Wheel Co.
B&B—Ball & Ball
B-Beck—Borg & Beck
Berlg—Berling
Bet—Betts Spring Co.
Bim—Bimel
B-Lipe—Brown-Lipe
Blood—Blood Bros.
Brem—Bremer
Bvr—Beaver Mfg. Co.
B&W—B & W Mfg. Co.
Can—Candler Radiator
Cant—Canton-Cleveland
Carl—Carleton Co.
Cart—Carter Carburetor
Cas—G. M. Castle
CAS—C. A. S. Products
Chgo—Chicago Mfg. Co.
Chic—Chicago-Standard
Chmp—Champion Auto Spring Co.
Chy—Cheney
Clrk—Clark Equipment
Col—Columbia Axle
Con—Continental Motors
Conn—Connecticut
Crn—Crane & MacMahon Co.
C-S—Christopher Sharpson Iron Co.
Day—Dayton
Del—Delaney
Detlaf—Detlaff

Gasoline Motor Trucks for 1920—Cont.

ENGINE									TRANSMISSION										BRAKES		CONTROL			UNIVERSALS		
GOVERNOR			SPEED		FUEL SYS		CLUTCH		GEARSET				FINAL DRIVE								STEERING GEAR					
Type	Make	Drive	Motor in r.p.m.	Truck in m.p.h.	Carbureter Make	Fuel Feed	Type	Make	Type	Make	Placed	Speeds	Type	Rear Axle Make	Total Gear Reduction	Propulsion Taken By	Torque Taken By	Springs Make	Foot	Hand	Placed	Make	Levers	Type	Make	Name and Model
cent.	own...	motor	1200	18	Zenith.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	3	worm.	Timkn.	7.00	r-rd...	sprgs..	S-P...	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Spicer..	Clydesdale.....42
cent.	own...	motor	1100	14	Zenith.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	8.50	r-rd...	sprgs..	S-P...	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Spicer..	Clydesdale.....65X
cent.	own...	motor	1100	13	Zenith.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	10.33	r-rd...	sprgs..	S-P...	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Spicer..	Clydesdale.....90
cent	own...	motor	1100	10	Stmbg.	vac...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	11.67	r-rd...	sprgs..	S-P...	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Spicer..	Clydesdale.....120B
suct..	Mnrch.	motor	.....	.....	Zenith.	vac...	d-d...	Fuller..	.....	Fuller..	motr..	3	worm.	.....	.....	.....	.....	.....	int-r-w..	int-r-w..	l...	Ross..	tr..	mtl..	D troit.	Collier.....18
suct..	Mnrch.	motor	.....	.....	Zenith.	vac...	d-d...	Fuller..	.....	Fuller..	motr..	3	worm.	.....	.....	.....	.....	.....	int-r-w..	int-r-w..	l...	Ross..	tr..	mtl..	D troit.	Collier.....19
suct..	Mnrch.	motor	.....	.....	Zenith.	vac...	d-d...	Fuller..	.....	Fuller..	motr..	4	worm.	.....	.....	.....	.....	.....	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	D troit.	Collier.....20
cent.	Pierce.	motor	1200	18	Stmbg.	grv...	d-d...	Detlaf..	selec...	Covert.	motr..	3	int-g..	Russl..	7.70	sprgs..	sprgs..	S-P...	int-r-w..	int-r-w..	l...	own...	ctr..	mtl..	Spicer..	Columbia.....F
cent.	Hink..	motor	1200	15	Stmbg.	vac...	d-d...	Detlaf..	selec...	Covert.	amid..	3	int-g..	Russl..	9.40	sprgs..	sprgs..	S-P...	ext-r-w..	int-r-w..	l...	own...	ctr..	mtl..	Spicer..	Columbia.....G
none.	none...	none..	2200	30	Zenith.	vac...	cone..	Detrt..	selec...	Detrt..	motr..	3	int-g..	Torbn..	7.10	sprgs..	sprgs..	Dtr...	ext-r-w..	int-r-w..	l...	Jacox.	ctr..	mtl..	Spicer..	Commerce.....E
none.	none..	none..	2200	30	Zenith.	vac...	cone..	Detrt..	selec...	Detrt..	motr..	3	int-g..	Torbn..	7.10	sprgs..	sprgs..	Dtr...	ext-r-w..	int-r-w..	l...	Jacox.	ctr..	mtl..	Spicer..	Commerce.....EP
suct..	Mnrch.	motor	1170	18	Zenith.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	3	worm.	Timkn.	7.75	sprgs..	sprgs..	S-P...	int-r-w..	int-r-w..	l...	Ross.	ctr..	mtl..	Spicer..	Concord.....A
suct..	Mnrch.	motor	1266	16	Zenith.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	3	worm.	Timkn.	8.50	sprgs..	sprgs..	S-P...	int-r-w..	int-r-w..	l...	Ross.	ctr..	mtl..	Spicer..	Concord.....B
.....	.....	.....	1800	25	Stmbg.	grv...	d-p...	B-Beck.	selec...	Muncie	motr..	3	int-g	Torbn..	6.50	sprgs..	sprgs..	Iron..	ext-r-w..	int-r-w..	l...	CAS.	ctr..	mtl..	Spicer..	Conestoga.....12
.....	.....	.....	1350	17	Stmbg.	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	worm.	Wis....	7.75	sprgs..	sprgs..	Iron..	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Sterl...	Conestoga.....20
.....	Dplx...	.....	1350	14	Stmbg.	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	worm.	Wis....	9.66	sprgs..	sprgs..	Iron..	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Sterl...	Conestoga.....30
cent.	Dplx...	motor	1500	18	Stmbg.	vac...	d-d...	Fuller..	selec...	Fuller..	motr..	3	worm.	Shel...	6.50	sprgs..	sprgs..	Shel...	int-r-w..	int-r-w..	l...	Lavn.	ctr..	mtl..	Hart...	Corbitt.....E
cent.	Dplx...	motor	1200	18	Stmbg.	vac...	d-d...	Fuller..	selec...	Fuller..	motr..	3	worm.	Shel....	8.67	sprgs..	sprgs..	Shel...	int-r-w..	int-r-w..	l...	Lavn.	ctr..	mtl..	Hart...	Corbitt.....D
cent	Dplx...	motor	1200	16	Stmbg.	vac...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	3	worm.	Shel....	8.75	sprgs..	sprgs..	Shel...	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Hart...	Corbitt.....C
cent.	Dplx...	motor	1200	16	Stmbg.	vac...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	4	worm.	Shel...	8.75	sprgs..	sprgs..	Shel...	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Hart...	Corbitt.....B
cent.	Pierce..	motor	1100	14	Stmbg.	vac...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	4	worm.	Shel...	11.75	sprgs..	sprgs..	Shel...	int-r-w..	int-r-w..	l...	Ross.	ctr..	mtl..	Hart...	Corbitt.....A
cent.	Con...	motor	1000	11	Stmbg.	vac...	d-d...	Detlaf..	selec...	B-Lipe.	amid..	4	worm.	Shel....	11.75	sprgs..	sprgs..	Shel...	int-r-w..	int-r-w..	l...	Ross.	ctr..	mtl..	Blood..	Corbitt.....AA
none.	none...	.....	1280	16	Zenith.	grv...	d-d...	Covert.	selec...	Covert.	motr..	3	worm.	Wis....	7.75	sprgs..	sprgs..	Iron..	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Hart...	Day-Elder.....A
none.	none...	.....	1250	15	Zenith.	grv...	d-d...	Covert.	selec...	Covert.	motr..	3	worm.	Wis....	8.33	sprgs..	sprgs..	Iron..	Int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Hart...	Day-Elder.....B
suct..	Mnrch.	motor	1000	14	Zenith.	grv...	d-d...	Covert.	selec...	Covert.	motr..	3	worm.	Wis....	7.67	sprgs..	sprgs..	Iron..	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Hart...	Day-Elder.....D
suct..	Mnrch.	motor	950	14	Zenith.	grv...	d-d...	Covert.	selec...	Covert.	motr..	3	worm.	Wis....	8.67	sprgs..	sprgs..	Iron..	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Hart...	Day-Elder.....C
suct.	Mnrch.	motor	900	12	Zenith.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	4	worm.	Wis....	10.10	sprgs..	sprgs..	Iron..	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Hart...	Day-Elder.....F
suct..	Mnrch.	motor	800	10	Zenith.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Shel...	8.75	sprgs..	sprgs..	Iron..	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Hart...	Day-Elder.....E
.....	.....	.....	.....	.....	.....	vac...	d-d...	Fuller..	.....	Fuller..	motr..	3	worm.	Chic....	.....	sprgs..	sprgs..	.....	int-r-w..	int-r-w..	l...	.....	ctr..	mtl..	Hart...	Dearborn.....F
.....	.....	.....	.....	.....	Stmbg.	vac...	d-d...	B-Beck.	selec...	G-Lees.	motr..	3	worm.	Chic....	.....	sprgs..	sprgs..	.....	int-r-w..	int-r-w..	l...	.....	ctr..	mtl..	Hart...	Dearborn.....BW
none.	none...	.....	1700	25	Stmbg.	vac...	d-p...	B-Beck.	selec...	G-Lees.	motr..	3	int-g..	Torbn..	7.60	sprgs..	sprgs..	Dtr...	int-r-w..	int-r-w..	l...	.....	ctr..	mtl..	.....	Defiance.....D
none.	none...	.....	1800	25	Stmbg	vac...	d-p...	B-Beck.	selec...	G-Lees.	motr..	3	int-g..	Torbn..	9.10	sprgs..	sprgs..	Dtr...	int-r-w..	int-r-w..	l...	own...	ctr..	mtl..	.....	Defiance.....E
none.	none...	.....	1500	18	Mast...	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	worm.	Timkn.	8.50	r-rd...	t-arm.	Mth..	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Hart...	DeKalb.....E2
none.	none...	.....	1500	14	Mast...	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	worm.	Timkn.	9.33	r-rd...	t-arm.	Mth..	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Hart...	DeKalb.....E2½
suct..	Mnrch.	motor	.....	.....	Stmbg.	.....	d-d...	Fuller..	.....	Fuller..	.....	3	int-g.	Russl.	.....	.....	.....	Dtr...	.....	.....	.....	Ross..	.....	.....	Univl.	Denby.....12
suct..	Mnrch.	motor	.....	.....	Stmbg.	.....	d-d...	Fuller..	.....	Fuller..	.....	4	int-g.	Russl.	.....	.....	.....	Dtr...	.....	.....	.....	Gem..	.....	.....	Univl.	Denby.....134
suct..	Mnrch.	motor	.....	.....	Stmbg.	.....	d-d...	Fuller..	.....	Fuller..	.....	4	int-g.	Russl.	.....	.....	.....	Dtr...	.....	.....	.....	Gem..	.....	.....	Univl.	Denby.....25
.....	Simp...	.....	.....	.....	Stmbg.	.....	d-d...	.....	.....	Warn..	.....	4	int-g.	Clrk...	.....	.....	.....	Dtr...	.....	.....	.....	Ross..	.....	.....	Univl.	Denby.....210
.....	.....	.....	.....	18	Stmbg.	vac...	d-d...	.....	selec...	.....	motr..	3	worm.	.....	8.25	sprgs..	sprgs..	Mth..	int-r-w..	int-r-w..	l...	.....	ctr..	mtl*.	Spicer*	Diamond-T.....T
.....	.....	.....	.....	18	Stmbg.	vac...	d-d...	.....	selec...	.....	motr..	3	worm.	.....	8.25	sprgs..	sprgs..	Mth..	int-r-w..	int-r-w..	l...	.....	ctr..	mtl*.	Spicer*	Diamond-T.....FS
cent.	Pierce..	motor	.....	16	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	3	worm.	.....	7.75	sprgs..	sprgs..	Mth..	int-r-w..	int-r-w..	l...	.....	ctr..	mtl*.	Spicer*	Diamond-T.....J4
cent.	Pierce..	motor	.....	15	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	3*	worm.	.....	7.75*	sprgs..	sprgs..	Mth..	int-r-w..	int-r-w..	l*	.....	ctr..	mtl*.	Spicer*	Diamond-T.....J3
cent.	Pierce..	motor	.....	12	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	.....	8.75	sprgs..	sprgs..	Mth..	int-r-w..	int-r-w..	l...	.....	ctr..	mtl..	Spicer..	Diamond-T.....LB
cent.	Pierce..	motor	.....	10	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	.....	13.66	sprgs..	sprgs..	Mth..	int-r-w..	int-r-w..	l...	.....	ctr..	mtl..	Spicer..	Diamond-T.....R
cent.	Pierce..	motor	.....	10	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	.....	13.66	sprgs..	sprgs..	Mth..	int-r-w..	int-r-w..	l...	.....	ctr..	mtl..	Spicer..	Diamond-T.....S
cent.	own...	motor	1100	15	Stmbg.	grv...	d-d...	Warner	selec...	Warner	amid..	4	worm.	Timkn.	7.75	sprgs..	sprgs..	Mth..	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Spicer..	Dorris.....K-4
cent.	own...	motor	1100	12	Stmbg.	grv...	d-d...	Warner	selec...	Warner	amid..	4	worm.	Timkn.	10.33	sprgs..	sprgs..	Mth..	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Spicer..	Dorris.....K-7
cent.	.....	motor	1800	18	Schblr..	vac...	d-d...	Fuller..	selec...	Fuller..	motr..	3	int-g..	Torbn..	8.00	sprgs..	sprgs..	own...	ext-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Arvac..	Douglas.....C
cent.	Pierce..	motor	1400	15	.....	vac...	d-d...	Fuller..	selec...	Fuller..	motr..	4	int-g..	Torbn..	4.00	sprgs..	sprgs..	own...	ext-r-w..	int-r-w..	l...	Ross..	.....	mtl..	Arvac..	Douglas.....E
cent.	Dplx...	dpl.	1120	15	Schblr..	vac...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	4	int-g-i	own....	38.4*	r-rd...	sprgs..	Tuth..	ext-d-s.	ext-r-w..	l...	Wol..	ctr..	mtl..	Blood..	Duplex.....E
none.	none...	none..	2200	35	Zenith.	vac...	cone..	own...	selec...	Warn..	motr..	3	int-g..	Torbn..	6.51	sprgs..	sprgs..	S-P...	ext-r-w..	int-r-w..	l...	Jacox.	ctr..	mtl..	Hart...	Economy.....T-LHD
none.	none...	.....	2200	35	Hol*...	grv...	cone..	own...	prog...	own...	amid..	2	bevel..	own....	3.60	sprgs..	sprgs..	Tuth..	int-r-w..	int-r-w..	l...	own...	l...	mtl..	own...	Elmira.....C
cent.	Pierce..	.....	.....	.....	Stmbg.	grv...	d-d...	.....	.....	.....	amid..	4	worm.	Timkn.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Erie.....
cent.	Pierce..	.....	.....	.....	Stmbg.	grv...	d-d...	.....	.....	.....	amid..	4	worm.	Timkn.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Erie.....
cent.	Pierce..	.....	.....	.....	Stmbg.	grv...	d-d...	.....	.....	.....	amid..	4	worm.	Timkn.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Erie.....
cent.	Pierce..	.....	.....	.....	Stmbg.	grv...	.....	.....	.....	.....	amid..	4	worm.	Timkn.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Erie.....
cent.	Wau...	motor	1000	20	Zenith.	grv...	d-d...	B-Lipe.	prog...	B-Lipe.	motr..	5	worm.	Timkn.	5.60	sprgs..	.....	Mth..	int-r-w..	int-r-w..	l...	Ross..	ctr..	fab*.	Therm*	Fageol.....2½
cent.	.....	motor	950	.....	Zenith.	vac...	d d...	B-Lipe.	selec...	own...	amid..	5	worn..	Timkn.	7.47	r-rd...	t-arm.	Mth..	int-r-w..	int-r-w..	l...	Ross..	ctr..	fab*.	Therm*	Fageol.....3½
cent.	Wau...	motor	950	.....	Zenith.	vac...	d-d...	B-Lipe.	selec...	own...	amid..	5	worm.	Timkn.	9.85	r-rd..	t-arm.	Mth..	int-r-w..	int-r-w..	l...	Ross..	ctr..	fab*.	Therm*	Fageol.....5

ABBREVIATIONS—Makers of Parts—(Continued)—

Detrt—Detroit G. & M.
Ditw—Ditwiler Mfg. Co.
Dneto—Dyneto
Drt—Detroit Pressed Steel Co.
Dtr—Detroit Products
Dtrl—Detroit Lubricator
Dun—Dunbar Mfg. Co.
Dur—Durston Gear Corp.
E&M—English & Merrick
E&O—Eberly & Orris
Eismn—Eisemann
Ens—Ensign Carburetor
Eric—Ericsson Mfg. Co.
Eurk—Eureka
F&H—French & Hecht
FAC—F. A. Chapper
Fed—Fedders
Flx—Flexo Mfg. Co.
Frank—Francke Co.
G&D—Gray & Davis
G&O—G & O Mfg. Co.
GCS—Garden City Springs
Gem—Gemmer
G-Lees—Grant-Lees
Grn—Greens Car Wheel
H&D—Hoopes Bros. & Darlington
Har—Harrison
Hart—Hartford
Harv—Harvey
Hay—Hayes Wheel Co.
Her—Hercules
Hig—Higgins
Hink—Hinkley
Hol—Holley
H-Shaw—Hele-Shaw
H-S—Herschell-Spillman
Hyd—Hydraulic
Idl—Ideal
Ind—Indestructible
Iron—Iron City
Jacox—Jackson-Church-Wilcox
Jck—Jackson Auto
Jns—Phineas Jones & Co.
John—Johnson Co.
Kal—Kalamazoo
Kel—Kelsey Wheel Co.
Ken—Kenosha Wheel & Darlington
Knz—Kuntz
Lavn—Lavine
LeR—Le Roi
Lght—Light Mfg. Co.
L-N—Leece-Neville Co.
Lng—Long
Lvgn—Livingston
Lyc—Lycoming
Marvl—Marvel
Mas—F. C. Mason & Co.
Mast—Master
McCn—McCanna
M&E—Merchant & Evans
McC—McCord
Mech—Mechanics Mach. Co.
Merl—Merrill Spring Co.
Miller—H. A. Miller
Mnrch—Monarch
Mod—Modine Mfg. Co.
Mot—Mott Wheel Wks.
M-R—Marlin-Rockwell
MSC—Massillon
Mth—Mather
Mut—Mutual Wheel Co.
Nat—National Spring
Natl—National Can Co.
N-E—North East
Nich—Nichols Elec. Co.
P&B—Parish & Bingham
Perk—Perkins
Pet—Peters Mach. Co.
Pfx—Perfex Radiator
Phil—Philadelphia
Phro—Pharo Mfg. Co.
Prsh—Parish Mfg. Co.
Prud—Prudden
Rayfld—Rayfield
Rem—Remy
Rowl—Wm. H. Rowland
Roy—Royer Wheel Co.
R-T—Rome-Turney
Rugl—Ruggles
Rus—Russel Car & Frdy.
Russl—Russel Axle Co.
Rut—Rutenber
R&V—Root & VanDervoort
Sag—Saginaw
Sal—Salisbury
Savg—Savage Arms
Sch—Schwarz Wheel Co.
Schblr—Schebler
Shel—Sheldon
Simp—Simplex
S-J—Shotwell-Johnson
S-M—Standard Malleable
Smh—A. O. Smith
Sth—Smith Steel Wheel
S-P—Standard Parts Co.
Spltf—Splitdorf
Sp-P—Spring Perch Co.
Stan—Standard Radiator
Stand—Standard Steel Spring Co.
Sterl—Sterling Bearings
Stmbg—Stromberg
Stn—Standard Wheel Co.
S-W—Sparks-Withington
Sum—Sumter Elec. Co.
Therm—Thermoid
Timkn—Timken
Torbn—Torbensen
Tuth—Tuthill
Univl—Universal Prdts.
Unv—Universal
Unvsl—Universal Mach.
U. S.—U. S. Spring Co.
Wag—Wagner
Warn—Warner
Wau—Waukesha
West—Westinghouse
Wil-B—Wilcox Bennett
Wis—Wisconsin Parts
W-L—Ward-Leonard
W&L—Waterhouse & Lester Co.
Way—Wayne Wheel Co.
Wol—Wohlrab
Wsc—Wisconsin
Yng—Youngstown Pressed Steel Co.

Detailed Technical Specifications of

Name and Model	Tons Capacity	Chassis Price	Wheelbase, Inches	FRAME Make	FRAME Material	FRAME Type	TIRES Kind	TIRES Size in Ins. Front	TIRES Size in Ins. Rear	WHEELS Make	WHEELS Type	ENGINE Make	ENGINE No. Cyl Bore and Stroke—N.A.C.C. Hp.	ENGINE Cylinders Cast	COOLING Water Circ.	COOLING Radiator CASE Make	COOLING Radiator CASE Type	COOLING Radiator CORE Make	COOLING Radiator CORE Type	IGNITION Type	IGNITION Make	IGNITION Spark Advance	ELEC. SYSTEM Type	ELEC. SYSTEM Make	ELEC. SYSTEM Extra Cost $
Famous B1C	1	$1,690	120	Savg.	p-stl.	flex.	sol*	36x3½	36x4	Bim.	wd.	Con.	4-3½x5-19.6	4	ther.	Chgo.	cst.	Chgo.	fin.	sing.	Eismn.	fixed.	lghtg.	Eismn.	120
Federal SD	1	2,300	132	Drt.	p-stl.	s-flex.	pnu.	35x5	36x6	Drt.	mt.	Con.	4-3⅞x5-22.5	4	cent.	own.	prs.	MeC*	fin.	sing.	Eismn.	fixed.	lghtg*	Aut-L.	none
Federal TE	1½	2,500	144	Drt.	p-stl.	s-flex.	sol.	36x3½	36x5	Sch*	wd.	Con.	4-4½x5½-27.2	4	cent.	own.	prs.	MeC*	fin.	sing.	Eismn.	fixed.	.....	.....	.....
Federal UE	2	2,800	156	Drt.	p-stl.	s-flex.	sol.	36x4	36x7	Sch*	wd.	Con.	4-4½x5½-27.2	4	cent.	own.	prs.	MeC*	fin.	sing.	Eismn.	fixed.	.....	.....	.....
Federal WD	3½	3,650	156	Drt.	p-stl.	s-flex.	sol.	36x5	36x5d	Sth.	mt.	Con.	4-4½x5½-32.4	2	cent.	own.	prs.	MeC*	fin.	sing.	Eismn.	fixed.	.....	.....	.....
Federal XC	5	4,500	156	Rus.	rol-c.	s-flex.	sol.	36x6	40x6d	Sth.	mt.	Con.	4-4½x5½-32.4	2	cent.	own.	prs.	MeC*	fin.	sing.	Eismn.	fixed.	.....	.....	.....
Federal Light Tractor	....	2,950	120	Drt.	p-stl.	s-flex.	sol.	36x4	36x7	Sch*	wd.	Con.	4-4½x5½-27.2	4	cent.	own.	prs.	MeC*	fin.	sing.	Eismn.	fixed.	none.	none.	none
Federal Heavy Tractor	....	3,775	114½	Rus.	rol-c.	s-flex.	sol.	36x5	36x5d	Sth.	mt.	Con.	4-4½x5½-32.4	2	cent.	own.	prs.	MeC*	fin.	sing.	Eismn.	fixed.	none.	none.	none
Ford TT	1	550	124	P&B.	p-stl.	flex.	p&s.	30x3½	32x3½	Prud*	wd.	own.	4-3½x4 -22.5	4	ther.	own.	sht.	own.	fin.	sing.	own.	hand.	lghtg.	.....	.....
Forschler AX	1½	2,375	120	own.	rol-c.	flex.	sol*	36x3½	36x5	Sth.	mt.	Con.	4-3½x 5-19.6	4	cent.	own.	cst.	own.	fin.	sing.	Bosch.	fixed.	.....	.....	.....
Forschler B	2	2,750	144	own.	rol-c.	flex.	sol*	36x4	36x7	Sth.	mt.	Con.	4-4½x5½-27.2	4	cent.	own.	cst.	own.	fin.	sing.	Bosch.	fixed.	.....	.....	.....
Forschler BX	3	3,450	144	own.	rol-c.	flex.	sol*	36x4	36x8	Sth.	mt.	Con.	4-4½x5½-27.2	4	cent.	own.	cst.	own.	fin.	sing.	Bosch.	fixed.	.....	.....	.....
F. W. D B	3	4,500	124	Prsh.	p-stl.	flex.	sol*	36x6	36x6	Sch*	wd*	Wsc.	4-4½x5½-36.2	2	cent.	Lng.	cst.	Lng.	fin.	sing.	Eismn.	hand.	s&l.	N-E.	350
Fulton A	1	.....	130	.....	p-stl.	.....	pnu.	.....	.....	.....	.....	wd.	4-3½x5 -19.6	4	ther.	.....	.....	.....	.....	.....	.....	hand.	s&l.	.....	.....
Fulton O	2	2,350	137	P&B.	p-stl.	s-flex.	sol.	34x4	34x6	E&O.	wd.	H-S.	4-3½x5 -16.9	4	ther.	G&O.	cst.	G&O.	zz-t.	sing.	Simms	hand.	none.	none.	none
Gabriel C	1	2,000	136	Prsh.	p-stl.	s-flex.	pnu.	35x5	35x5	Stn.	wd.	Buda.	4-4¼x5½-29.0	4	cent.	G&O.	cst.	G&O.	cel.	sing.	Bosch.	hand.	s&l-2.	L-N.	100
Gabriel E	2	3,250	156	Prsh.	p-stl.	s-flex.	sol*	36x4*	36x7*	Stn.	wd.	Buda.	4-4¼x5½-29.0	4	cent.	G&O.	cst.	G&O.	cel.	sing.	Bosch.	hand.	s&l-2	L-N.	100
Gabriel F	4	4,300	180	Prsh.	p-stl.	s-flex.	sol.	36x5	40x6d*	Sth.	mt.	Buda.	4-4½x6 -32.4	4	cent.	G&O.	cst.	G&O.	cel.	sing.	Bosch.	hand.	s&l-2.	L-N.	100
Garford 25	1½	2,090	135	own.	p-stl.	s-flex.	sol.	36x3½	36x4	.....	wd.	Buda.	4-3½x5½-22.5	4	cent.	own.	cst.	.....	fin.	sing.	Splft.	hand.	sl&i.	West	125
Garford 70-H	2	3,190	144	own.	p-stl.	s-flex.	sol*	36x4	36x7	Bim.	wd.	Buda.	4-4½x5½-29.0	4	cent.	own.	cst.	own.	fin.	sing.	Splft.	hand.	s&l.	West.	125
Garford 68	5	5,000	128	own.	p-stl.	s-flex.	sol.	36x6	40x6d	Sth.	mt.	Wsc.	4-4½x5½-36.1	2	cent.	own.	cst.	own.	fin.	dual.	Eismn.	hand.	lghtg.	West.	125
Garford 69	6	5,300	128	own.	p-stl.	s-flex.	sol.	36x6	40x7d	Sth.	mt.	Wsc.	4-5 ¼x5½-41.6	2	cent.	own.	cst.	own.	fin.	dual.	Eismn.	hand.	lghtg.	West.	125
Gary F	1	1,900	130	P&B.	p-stl.	rigid.	sol.	36x3½	36x4	Bim.	wd.	Buda.	4-3½x5 -16.9	4	cent.	Chgo.	cst.	Chgo.	fin.	sing.	Eismn.	hand.	.....	.....	.....
Gary GT	1	2,250	141	P&B.	p-stl.	rigid.	sol.	36x3½	36x5	Bim.	wd.	Buda.	4-4 x5¼-25.6	4	cent.	Chgo.	cst.	Chgo.	fin.	sing.	Eismn.	hand.	.....	.....	.....
Gary J	2	2,750	148	P&B.	p-stl.	rigid.	sol.	36x4	36x7	Bim.	wd.	Buda.	4-4½x5½-29.0	4	cent.	Chgo.	cst.	Chgo.	fin.	sing.	Eismn.	hand.	.....	.....	.....
Gary KT	3½	3,850	162	P&B.	p-stl.	rigid.	sol.	36x5	40x5d	Bim.	wd.	Buda.	4-4½x6 -32.4	4	cent.	Chgo.	cst.	Chgo.	fin.	sing.	Eismn.	hand.	.....	.....	.....
Gary M	5	4,850	182	P&B.	p-stl.	rigid.	sol.	36x6	40x6d	Day.	mt.	Buda.	4-5 x6½-40.0	4	cent.	Chgo.	cst.	Chgo.	fin.	sing.	Eismn.	hand.	.....	.....	.....
G. M. C 16	½	1,495	132	Smh.	p-stl.	s-flex.	pnu.	35x5	35x5	.....	wd.	Con.	4-3½x5 -22.5	4	cent.	MeC.	prs.	MeC.	fin.	sing.	Eismn.	hand.	sl&i-2.	Delco.	.....
G. M. C 21	1½	2,395	130	Smh.	p-stl.	s-flex.	sol.	36x3½	36x5	opt.	wd.	Con.	4-3½x5 -22.5	4	cent.	MeC.	cst.	MeC.	fin.	sing.	Eismn.	hand.	lghtg-2	Eismn.	.....
G. M. C 41	2	2,725	144	Smh.	p-stl.	s-flex.	sol.	36x4	36x7	own.	mt.	Con.	4-4¼x5½-27.2	4	cent.	MeC.	cst.	MeC.	fin.	sing.	Eismn.	hand.	lghtg-2	Eismn.	.....
G. M. C 71	3½	3,750	163	own.	rol-c.	s-flex.	sol.	36x5	40x5d	own.	mt.	Con.	4-4½x¼-32.4	2	cent.	MeC.	cst.	MeC.	fin.	sing.	Eismn.	hand.	lghtg-2	Eismn.	.....
G. M. C 101	5	4,350	163	own.	rol-c.	s-flex.	sol.	36x6	40x6d	.....	wd.	Con.	4-4½x5½-32.4	2	cent.	MeC.	cst.	MeC.	fin.	sing.	Eismn.	hand.	lghtg-2	Eismn.	.....
Giant 15	1	1,950	138	Hyd.	p-stl.	s-flex.	sol*	34x3½	34x5	Way.	wd.	Con.	4-3½x 5-22.5	4	ther.	Idl.	prs.	Idl.	cel.	sing.	Eismn.	hand.	none.	none.	none
Giant 14	1½	.....	144	Hyd.	p-stl.	s-flex.	sol*	34x3½	34x5	Way.	wd.	Buda.	4-3½x5½-22.5	4	ther.	Idl.	prs.	Idl.	cel.	sing.	Eismn.	hand.	none.	none.	none
Giant 16	2	2,850*	144*	Hyd.	p-stl.	s-flex.	sol*	36x4	36x7	Way.	wd.	Con.	4-4¼x5½-27.2	4	cent.	own.	cst.	Idl.	cel.	sing.	Eismn.	hand.	none.	none.	none
Giant 17	3½	3,850	176	own.	rol-c.	s-flex.	sol.	36x5	36x5d	Way.	wd.	Con.	4-4½x5½-32.4	2	cent.	own.	cst.	Jck.	cel.	sing.	Eismn.	hand.	none.	none.	none
Grant 10	1½	1,885	124	Savg.	p-stl.	rigid.	p&s.	34x4½	34x5	Bim.	wd.	Con.	4-3½x 5-22.5	4	ther.	Fed.	sht.	Fed.	cel.	dual.	.....	hand.	sl&i-2.	Remy.	none
Grant 11	1½	1,935	140	Savg.	p-stl.	rigid.	p&s.	34x4½	34x5	Bim.	wd.	Con.	4-3½x 5-22.5	4	ther.	Fed.	sht.	Fed.	cel.	dual.	Splft.	hand.	sl&i-2.	Remy.	none
Grant 15	2	2,150	124	Savg.	p-stl.	rigid.	sol*	34x4	34x6	Bim.	wd.	Con.	4-3½x 5-22.5	4	ther.	Fed.	sht.	Fed.	cel.	dual.	Splft.	hand.	sl&i-2.	Remy.	none
Grant 16	2	2,250	140	Savg.	p-stl.	rigid.	pnu.	34x4½	34x6	Bim.	wd.	Con.	4-3½x 5-22.5	4	ther.	Fed.	sht.	Fed.	cel.	dual.	Splft.	hand.	sl&i-2.	Remy.	none
Hal-Fur D	1	2,000	136	P&B.	p-stl.	s-flex.	pnu.	35x5	35x5	Stn.	wd.	Buda.	4-4 x5 -25.6	4	cent.	own	cst.	G&O.	fin.	sing.	Bosch.	hand.	sl&i.	West.	150
Hal-Fur B	2½	2,750	168	P&B.	p-stl.	s-flex.	sol*	35x5	36x7	Msc.	mt.	Buda.	4-4½x5½-29.0	4	cent.	own	cst.	G&O.	fin.	sing.	Bosch.	hand.	none.	none.	none
Harvey WEA	1½	2,350	128	own.	p-stl.	flex.	sol.	34x3½	34x5	Sch.	wd.	Buda.	4-4½x5½-27.2	4	cent.	Chgo.	cst.	Chgo.	fin.	sing.	Bosch.	fixed.	.....	.....	.....
Harvey WFA	2½	3,300	150	own.	rol-c.	s-flex.	sol.	36x4	36x7	Sch.	wd.	Buda.	4-4½x5½-29.0	4	cent.	Chgo.	cst.	Chgo.	fin.	sing.	Eismn.	auto.	.....	.....	.....
Harvey WHA	3½	4,300	160	own.	rol-c.	s-flex.	sol.	36x5	36x5d	Sch.	wd.	Buda.	4-4½x 6-32.4	4	cent.	Chgo.	cst.	Chgo.	fin.	sing	Eismn.	auto.	.....	.....	.....
Harvey WKA	5	5,000	160	own.	rol-c.	s-flex.	sol.	36x6	40x6d	Sth.	mt.	Buda.	4-4½x 6-32.4	4	cent.	Chgo.	cst.	Chgo.	fin.	sing.	Eismn.	auto.	.....	.....	.....
Hawkeye K	1½	1,995	148½	own.	rol-c.	s-flex.	sol*	34x3½	34x5	Bim.	wd.	Buda.	4-3½x5½-22.5	4	cent.	own.	cst.	Idl.	zz-t.	sing.	Eismn.	hand.	.....	.....	.....
Hawkeye M	2	2,650	148½	own.	rol-c.	s-flex.	sol*	36x4	36x6	Bim.	wd.	Buda.	4-4½x5½-29.0	4	cent.	own.	cst.	Idl.	zz-t.	sing.	Eismn.	hand.	lghtg.	West.	85
Highway-Knight A	4	4,800	159	Hyd.	p-stl.	flex.	sol*	36x5	36x6d	Sch.	wd.	R&V.	4-4 x6 -25.6	4	ther.	own.	cst.	R-T.	fin.	sing.	Eismn.	hand.	sl&i-2.	Wag.	none
Highway-Knight B	5	5,600	159	Hyd.	p-stl.	flex.	sol.	36x5	40x6d	Sch.	wd.	R&V.	4-4 x6 -25.6	4	ther.	own.	cst.	R-T.	fin.	sing.	Eismn.	hand.	s&l-2.	Wag.	none
Huffman B	1½	1,895	140	Hyd.	p-stl.	s-flex.	sol*	34x3½	34x4	Roy.	wd.	Con.	4-3½x5 -16.9	4	ther.	Lvgn.	cst.	Lvgn.	cel.	sing.	Splf.	hand.	.....	.....	.....
Huffman C	1½	1.695	140	Hyd.	p-stl.	s-flex.	sol*	34x3½	34x4	Roy.	wd.	Buda	4-3½x5 -16.9	4	ther.	Lvgn.	cst.	Lvgn.	cel.	sing.	Splf.	hand.	.....	.....	.....
Hurlburt	1½	2,850	148	.....	p-stl.	.....	sol.	34x4	34x5	.....	.....	.....	4-4 x5½-25.6	.	cent.	.....	.....	.....	.....	.....	.....	hand.	.....	.....	.....
Hurlburt	2½	3,750	170	.....	p-stl.	.....	sol.	36x4	36x4d	.....	.....	.....	4-4½x5½-29.0	.	cent.	.....	.....	.....	.....	.....	.....	hand.	.....	.....	.....
Hurlburt	3½	4,400	156	.....	p-stl.	.....	sol.	36x5	36x5d	.....	.....	.....	4-4½x6 -32.4	.	cent.	.....	.....	.....	.....	.....	.....	hand.	.....	.....	.....
Hurlburt	5	5,250	156	.....	p-stl.	.....	sol.	36x5	40x6d	.....	.....	.....	4-4½x6 -32.4	.	cent.	.....	.....	.....	.....	.....	.....	hand.	.....	.....	.....

ABBREVIATIONS—Types of Construction

*****—other options
amid—amidship
auto—automatic
bevl—bevel
cel—cellular
cent—centrifugal
chn—chain
cst—cast
ctr—center
cylinders cast, 2 in pairs
cylinders cast, 4 in block
cylinders cast, 3 in threes
cylinders cast, 1 singly
cyl-ends—cylinder-ends
d—dual
d-d—dry-disk
d-p—dry-plate
dplx—from both motor & driveshaft
d-rd—double reduction
d-s—drive-shaft
elec—electric
ext-d-s—external drive-shaft
ext-f-w—external front wheel
ext-g—external gear
ext-jst—external jack-shaft
ext-r-w—external rear wheel
fab—fabric
fin—finned tube
flex—flexible
fric—friction
g-p—gear pump
grv—gravity
gset—from gearset
hyd—hydraulic
ind-c—individual clutch
int-g—internal gear
int-g-4—internal gear drive on 4 wheels
int-r-w—internal rear wheel
jst—unit with jackshaft
l—left
l-b—loose ball
lghtg—lighting only
motr—unit with motor
mt—metal (wheels)
mtl—metal (universal joint)
opt—optional
pist—piston pump
plan—planetary
pln—plain tube
pnu—pneumatic
pres—pressure
prog—progressive
prs—pressed steel
p&s—pneumatics in front, solids in rear
p-stl—pressed steel
r—right
r&c—right & center
r-rd—radius rods
rol-c—rolled channel
rol-i—rolled I-beam
selec—selective
s-flex—semi-flexible
sht—sheet
s&l—starting & lighting
sl&i-2—starting, lighting & ignition, 2 unit
sol—solid
sprgs—springs
sq-t—square-tube
start—starting only
t-arm—torque arm
ther—thermo-syphon
t-p—two-point
t-t—torsion tube
vac—vacuum
wat-tube—water tube
wd—wood
w-d—multiple disk in oil
w-p—plate in oil
wr—wire
z-t—zig-zag tube

ABBREVIATIONS—Makers of Parts

*Other Options
Acme—Acme Universal Joint Mfg. Co.
A-Knt—Atwater-Kent
Al-Ch—Allis-Chalmers
Aloy—Alloy Steel Spring
Amer—American Magneto Co.
Arch—Archibald
Arvac—Arvac Co.
Aut-L—Auto-Lite
Auto—Auto-Wheel Co.
A-W-W—Automotive Wire Wheel Co.
B&B—Ball & Ball
B-Beck—Borg & Beck
Berlg—Berling
Bet—Betts Spring Co.
Bim—Bimel
B-Lipe—Brown-Lipe
Blood—Blood Bros.
Brem—Bremer
Bvr—Beaver Mfg. Co.
B&W—B & W Mfg. Co.
Can—Candler Radiator
Cant—Canton-Cleveland
Carl—Carleton Co.
Cart—Carter Carburetor
Cas—G. M. Castle
CAS—C. A. S. Products
Chgo—Chicago Mfg. Co.
Chic—Chicago-Standard
Chmp—Champion Auto Spring Co.
Chy—Cheney
Clrk—Clark Equipment
Col—Columbia Axle Co.
Con—Continental Motor
Conn—Connecticut
Crn—Crane & Mac-Mahon Co.
C-S—Christopher Simpson Iron Co.
Day—Dayton
Del—Delaney
Detlaf—Detlaff

Gasoline Motor Trucks for 1920—Cont.

ENGINE									TRANSMISSION											BRAKES		CONTROL			UNIVERSALS		
GOVERNOR			SPEED		FUEL SYS.		CLUTCH		GEARSET				FINAL DRIVE									STEERING GEAR					
Type	Make	Drive	Motor in r.p.m.	Truck in m.p.h.	Carbureter Make	Fuel Feed	Type	Make	Type	Make	Placed	Speeds	Type	Rear Axle Make	Total Gear Reduction	Propulsion Taken By	Torque Taken By	Springs Make	Foot	Hand	Placed	Make	Levers	Type	Make	Name and Model
suct..	Mnrch..	motor	1350	18	Stmbg.	vac...	d-d...	Fuller..	selec...	Fuller..	motr..	3	int-g..	Clrk...	7.00	sprgs..	sprgs..	Shel...	ext-d-s..	ext-r-w..	l...	Ross..	ctr..	mtl..	Sterl...	Famous B10
cent.	Pharo..	motor	1450	25	Zenith.	vac...	d-p...	B-Beck.	selec...	own...	amid..	3	worm.	Timkn.	6.20	r-rd...	sprgs..	Mth..	int-r-w..	int-r-w..	l...	Gem..	ctr..	mtl..	Peters..	Federal ..... SD
cent.	Pharo..	motor	1190	15	Zenith.	grv...	d-p...	B-Beck.	selec...	Detrt..	amid..	4	worm.	Timkn.	8.50	r-rd...	sprgs..	Mth..	int-r-w..	int-r-w..	l...	Gem..	ctr..	mtl..	Spicer..	Federal ..... TE
cent.	Pharo..	motor	1125	13	Zenith.	grv...	d-p...	B-Beck.	selec...	Detrt..	amid..	4	worm.	Timkn.	9.25	r-rd...	sprgs..	Mth..	int-r-w..	int-r-w..	l...	Gem..	ctr..	mtl..	Spicer..	Federal ..... UE
cent.	Pharo..	motor	1150	12	Zenith	grv...	d-p...	B-Beck.	selec...	Warn..	amid..	4	worm.	Tmkn..	10.33	r-rd...	sprgs..	Mth..	int-r-w..	int-r-w..	l...	Gem..	ctr..	mtl..	Spicer..	Federal ..... WD
cent.	Pharo..	motor	1150	10	Zenith	grv...	d-p...	B-Beck.	selec...	Warn..	amid..	4	worm.	Tmkn..	13.66	r-rd...	sprgs..	Mth..	int-r-w..	int-r-w..	l...	Gem..	ctr..	mtl..	Spicer..	Federal XC
cent.	Pharo..	motor	1125	13	Zenith	grv...	d-p...	B-Beck.	selec...	Detrt..	amid..	4	worm.	Timkn.	9.25	r-rd...	sprgs..	Mth..	int-r-w..	int-r-w..	l...	Gem..	ctr..	mtl..	Spicer..	Federal ..... Light Tractor
cent.	Pharo..	motor	1150	12	Zenith.	grv...	d-p...	B-Beck.	selec...	Warn..	amid..	4	worm.	Timkn.	12.00	r-rd...	sprgs..	Mth..	int-r-w..	int-r-w..	l...	Gem..	ctr..	mtl..	Spicer..	Federal ..... Heavy Tractor
.....	.....	.....	1373	18	own...	grv...	w-d...	own...	plan...	own...	motr..	2	worm.	own....	7.25	r-rd...	t-t...	Mth*	ext-d-s..	int-r-w..	l...	own...	l...	mtl..	own...	Ford ..... TT
cent.	Dplx...	dplx...	1200	16	Zenith.	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	worm.	Shel....	7.80	sprgs..	sprgs..	own...	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	own...	Forschler ..... AX
cent.	Dplx...	dplx...	1200	12	Zenith.	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	worm.	Shel...	8.66	sprgs..	sprgs..	own...	int.....	int.....	l...	Ross..	ctr..	mtl..	own...	Forschler ..... B
cent	Dplx...	dplx...	1200	12	Zenith.	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	4	worm.	Shel...	8.75	sprgs..	sprgs..	own...	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	own...	Forschler ..... BX
cent.	Pierce..	motor	1350	15	Stmbg	grv...	w-d...	H-Shaw	ind-c...	Cotta..	amid..	3	bevel-4	own...	8.90	sprgs..	sprgs..	Tuth..	ext-d-s..	ext-r-w..	r...	Ross..	r...	mtl..	Blood..	F. W. D ..... B
.....	.....	.....	2000	.....	.....	.....	d-d...	B-Beck.	.....	.....	motr..	3	int-g..	.....	.....	.....	.....	.....	ext-r-w..	ext-d-s..	l*	.....	.....	.....	.....	Fulton ..... A
cent	Pierce..	motor	3200	35	Cart...	grv...	d-p...	B-Beck.	selec...	Dur....	motr..	3	int-g..	Russl..	10.20	sprgs..	sprgs..	Rowl.	ext-r-w..	ext-d-s..	l...	Lavn..	ctr..	mtl..	Univl..	Fulton C
none.	none...	.....	1200	25	Rayfld.	grv...	d-p...	B-Beck.	selec...	B-Lipe.	amid..	3	worm.	Timkn.	.....	r-rd...	t-arm.	Merl..	int-r-w..	int-r-w..	l...	Gem..	ctr..	mtl..	Spicer..	Gabriel C
cent.	Dplx...	motor	1100	18	Rayfld.	grv...	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	.....	r-rd...	sprgs..	Merl..	int-r-w..	int-r-w..	l...	Gem..	ctr..	mtl..	Spicer..	Gabriel ..... E
cent.	Dplx...	motor	1000	12	Rayfld.	grv...	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	.....	r-rd...	sprgs..	Merl..	int-r-w..	int-r-w..	l...	Gem..	ctr..	mtl..	Spicer..	Gabriel ..... F
cent.	Mnrch.	motor	1300	18	Stmbg.	grv...	d-d...	B-Lipe.	selec...	own....	amid..	3	worm.	Timkn.	7.75	sprgs..	sprgs..	S-P...	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl	Spicer..	Garford 25
cent.	Dplx...	motor	1085	15	Rayfld.	grv...	d-d...	B-Lipe.	selec...	own....	amid..	4	worm.	Timkn.	7.75	sprgs..	sprgs..	S-P...	int-r-w..	int-r-w..	r...	Ross..	ctr..	mtl..	Spicer..	Garford 70-H
cent.	Dplx...	motor	1057	11	Rayfld.	grv...	d-d...	B-Lipe.	selec...	own....	amid..	4	chn...	own....	11.44	r-rd...	.....	S-P...	ext-d-s..	int-r-w..	r...	Ross..	ctr..	mtl..	Spicer..	Garford 68
cent.	Dplx...	motor	1057	10	Rayfld.	grv...	d-d...	B-Lipe.	selec...	own....	amid..	4	chn...	own....	12.39	r-rd...	.....	S-P...	ext-d-s..	int-r-w..	r...	Ross..	ctr..	mtl..	Spicer..	Garford 69
cent.	Pierce..	motor	1000	15	Mast...	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	worm.	Timkn.	.....	sprgs..	sprgs..	Tuth..	int-r-w..	int-r-w..	l...	Lavn..	ctr..	mtl..	Blood..	Gary ..... F
cent.	Pierce..	motor	1000	15	Mast...	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	worm.	Timkn.	7.25	sprgs..	sprgs..	Tuth..	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Blood..	Gary ..... GT
.....	McCn..	motor	1000	15	Mast...	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	4	worm.	Timkn.	8.50	sprgs..	sprgs..	Tuth..	int.....	int.....	l...	Ross..	ctr..	mtl..	Spicer..	Gary ..... J
.....	McCn..	motor	1000	15	Mast...	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	amid.	4	worm.	Timkn.	10.33	sprgs..	sprgs..	Detr..	int.....	int.....	l...	Ross..	ctr..	mtl..	Spicer..	Gary ..... KT
.....	McCn..	motor	1000	15	Mast...	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	11.66	sprgs..	sprgs..	Detr..	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Spicer..	Gary ..... M
suct..	Mnrch.	motor	1150	20	Marvl..	grv...	d-d...	own...	selec...	own...	motr..	3	bevel..	own....	6.00	r-rd...	sprgs..	Detr..	ext-r-w..	int-r-w..	l...	own...	ctr..	mtl..	Unvsl..	G. M. C 16
suct..	Mnrch.	motor	1300	15	Marvl..	grv...	d-d...	own...	selec...	own. ..	motr..	4	worm.	timkn.	9.25	r-rd	sprgs..	Detr	int-r-w..	int-r-w..	l. ..	own. .	ctr..	mtl..	own. ..	G. M. C 21
suct.	Mnrch.	motor	1210	14	Marvl..	grv...	d-d...	own...	selec...	own. ..	motr..	4	worm.	Timkn.	9.25	r-rd	sprgs..	Detr	int-r-w..	int-r-w..	l. ..	own. .	ctr..	mtl..	own. ..	G. M. C 41
suct.	Mnrch.	motor	1210	12	Marvl..	grv...	d-d...	own...	selec...	own. ..	amid..	4	worm.	Timkn.	12.00	r-rd...	sprgs..	Detr	int-r-w..	int-r-w..	l. ..	own. .	ctr..	mtl..	own. ..	G. M. C 71
suct.	Mnrch.	motor	1150	10	Marvl..	grv...	d-d...	own...	selec...	own. ..	amid..	4	worm.	Timkn.	13.67	r-rd	sprgs..	Detr	int-r-w..	int-r-w..	l. ..	own. .	ctr..	mtl..	own. ..	G. M. C 101
cent.	Pierce..	motor	2000	26	Schblr.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	3	worm.	Shel. .	7.80	sprgs..	sprgs..	Shel...	int-r-w..	int-r-w..	r...	Jacox.	ctr..	mtl..	Spicer..	G ant 15
cent*	Pierce*	motor*	2000	26	Schblr.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	3	worm.	Shel. .	7.80	sprgs..	sprgs..	Shel...	int-r-w..	int-r-w..	l...	Ross .	ctr.	mtl..	Spicer..	Giant 14
cent.	Pierce..	motor	1500	21	Schblr.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	3	worm.	Shel...	8.66	sprgs..	sprgs..	Shel...	int-r-w..	int-r-w..	r...	Ross .	ctr..	mtl..	Spicer..	Giant 16
cent.	Pierce..	motor	1500	15	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Shel....	10.25	sprgs..	sprgs..	Shel...	int-r-w..	int-r-w..	r...	Ross .	ctr..	mtl..	Spicer..	Giant 17
cent.	Pierce..	d-s. ..	1100	16	Carter.	vac...	d-p...	B-Beck.	selec...	G-Lees	motr..	3	int-g .	Torbn..	7.00	sprgs..	sprgs..	S-P .	ext-r-w..	int-r-w..	.....	Jacox.	ctr..	mtl..	Arvac	Grant 10
cent.	Pierce..	d-s. ..	1100	16	Carter.	vac...	d-p...	B-Beck.	selec...	G-Lees	motr..	3	int-g .	Torbn..	7.00	sprgs..	sprgs..	S-P .	ext-r-w..	int-r-w..	.....	Jacox.	ctr..	mtl..	Arvac	Grant 11
cent.	Pierce..	d-s. ..	1100	14	Carter.	vac...	d-p...	B-Beck.	selec...	G-Lees	motr..	3	int-g .	Torbn..	8.00	sprgs..	sprgs..	S-P .	ext-r-w..	int-r-w..	.....	Jacox.	ctr..	mtl..	Arvac	Grant 15
cent.	Pierce..	d-s. ..	1100	14	Carter.	vac...	d-p...	B-Beck.	selec...	G-Lees	motr..	3	int-g .	Torbn..	8.00	sprgs..	sp-gs..	S-P .	ext-r-w..	int-r-w..	.....	Jacox.	ctr..	mtl..	Arvac	Grant 16
cent.	Dplx	motor	1400	25	Stmbg.	grv...	d-p...	B-Beck.	selec...	B-Lipe.	motr..	4	worm.	Timkn..	6.35	r rd	sprgs..	S-P...	int-r-w..	int-r-w..	l...	Gem .	ctr..	mtl..	Peters..	Hal-Fur ..... D
cent.	Dplx...	motor	1200	18	Stmbg.	grv...	d-p...	B-Beck	selec...	B-Lipe.	amid.	4	worm.	Timkn.	7.00	r rd...	sprgs..	S-P...	int-r-w..	int-r-w..	l...	Gem .	ctr..	mtl..	Peters..	Hal-Fur ..... B
suct.	Mnrch.	motor	1100	16	Zenith.	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	worm.	Shel...	7.75	sprgs..	sprgs..	Shel...	int-r-w..	int-r-w..	l...	Ross .	ctr..	mtl..	Arvac	Harvey ..... WEA
cent	Dplx...	moto	1100	16	Stmbg	grv...	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	worm.	Shel...	7.75	sprgs..	sprgs..	Shel...	int-r-w..	int-r-w..	l...	Ross .	ctr..	mtl..	Spicer..	Harvey ..... WFA
cent.	Dplx...	motor	1000	13	Stmbg	grv...	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	worm.	She'...	8.75	sprgs .	sprgs .	Shel...	int-r-w..	int-r-w..	l...	Ross.	ct .	mtl..	Spicer..	Harvey ..... WHA
cent.	Dplx...	mo or	900	11	Stmbg.	grv...	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	worm.	Shel....	8.75	sprgs..	sprgs .	Shel...	int-r-w..	int-r-w..	l...	Ross.	ctr	mtl..	Spic r.	Harvey ..... WKA
cent.	Simp...	motor	1145	16	Zenith.	grv...	d-p...	Fuller..	selec...	Fuller..	motr..	3	int-g..	Clrk...	7.60	sprgs .	sprgs .	Detr..	ext-r-w..	int-r-w..	l...	Ross.	ctr .	mtl..	Hart...	Hawkeye ..... K
cent.	Simp...	motor	1150	16	Zenith.	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	4	int-g..	Clrk...	8.00	sprgs..	prgs..	Detr..	ext-d-s.	int-r-w..	l...	Ross.	ctr..	mtl..	Hart...	Hawkeye ..... M
suct..	Mnrch.	motor	1500	19	Zenith.	vac...	d-d...	B-Lipe.	selec...	own...	amid..	4	worm.	Shel...	8.75	sprgs..	sprgs..	Shel...	int-r-w..	int-r-w..	l...	.....	ctr..	fab..	Therm.	Highway-Knight ..... A
suct..	Mnrch.	motor	1200	15	Zenith.	vac...	d-d...	B-Lipe.	selec...	own...	amid..	4	worm.	Shel....	10.20	sprgs..	sprgs..	Shel...	int-r-w..	int-r-w..	l...	.....	ctr..	fab..	Therm.	Highway-Knight ..... B
.....	.....	.....	.....	.....	.....	.....	d-d...	Fuller..	selec...	Fuller..	motr..	3	worm.	Chic...	8.00	sprgs..	sprgs..	S-P...	int-r-w..	int-r-w..	l...	Lavn..	ctr..	mtl..	Hart...	Huffman ..... B
.....	.....	.....	.....	.....	Zenith.	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	int-g..	Torbn..	8.00	sprgs..	sprgs..	S-P...	int-r-w..	int-r-w..	l...	Lavn..	ctr..	mtl..	Hart...	Huffman C
.....	.....	.....	.....	18	.....	.....	d-d...	.....	selec...	.....	motr..	3	worm.	.....	.....	.....	.....	.....	int-r-w..	int-r-w..	.....	.....	.....	.....	.....	Hurlburt .....
.....	.....	.....	.....	16	.....	.....	d-d...	.....	selec...	.....	motr..	3	worm.	.....	.....	.....	.....	.....	ext-r-w..	int-r-w	.....	.....	.....	.....	.....	Hur burt .....
.....	.....	.....	.....	13	.....	.....	d-d...	.....	selec...	.....	amid...	4	worm.	.....	.....	.....	.....	.....	ext-r-w..	int-r-w	.....	.....	.....	.....	.....	Hurlburt .....
.....	.....	.....	.....	12	.....	.....	d-d...	.....	selec...	.....	amid..	4	worm.	.....	.....	.....	.....	.....	ext-r-w..	int-r-w	.....	.....	.....	.....	.....	Hurlburt .....

ABBREVIATIONS—Makers of Parts—(Continued)—

Detrt—Detroit G. & M.
Ditw—Ditwiler Mfg. Co.
Dneto—Dyneto
Drt—Detroit Pressed Steel Co.
Dtr—Detroit Products
Dtrt—Detroit Lubricator
Dun—Dunbar Mfg. Co.
Dur—Durston Gear Corp.
E&M—English & Mersick
E&O—Eberly & Orris
Eisnn—Eisemann
Ens—Ensign Carburetor
Eric—Ericsson Mfg. Co.
Eurk—Eureka
F&H—French & Hecht
FAC—F. A. Chapper
Fed—Fedders
Flx—Flexo Mfg. Co.
Frank—Francke Co.
G&D—Gray & Davis
G&O—G & O Mfg. Co.
GCS—Garden City Springs
Gem—Gemmer
G-Lees—Grant-Lees
Grn—Greens Car Wheel
H&D—Hoopes Bros. & Darlington
Har—Harrison
Hart—Hartford
Harv—Harvey
Hay—Hayes Wheel Co.
Her—Hercules
Hig—Higgins
Hink—Hinkley
Hol—Holley
H-Shaw—Hele-Shaw
H-S—Herschell-Spillman
Hyd—Hydraulic
Idl—Ideal
Ind—Indestructible
Iron—Iron City
Jacox—Jackson-Church-Wilcox
Jck—Jackson Auto
Jns—Phineas Jones & Co.
John—Johnson Co.
Kal—Kalamazoo
Kel—Kelsey Wheel Co.
Ken—Kenosha Wheel &
Knz—Kuntz
Lavn—Lavine
LeR—Le Roi
Lght—Light Mfg. Co.
L-N—Leece-Neville Co.
Lng—Long
Lvgn—Livingston
Lyc—Lycoming
Marvl—Marvel
Mas—F. C. Mason & Co.
Mast—Master
McCn—McCanna
M&E—Merchant & Evans
McC—McCord
Mech—Mechanics Mach. Co.
Merl—Merrill Spring Co.
Miller—H. A. Miller
Mnrch—Monarch
Mod—Modine Mfg. Co.
Mot—Mott Wheel Wks.
M-R—Marlin-Rockwell
MSC—Massillon
Mth—Mather
Mut—Mutual Wheel Co.
Nat—National Spring
Natl—National Can Co.
N-E—North East
Nich—Nichols Elec. Co.
P&B—Parish & Bingham
Perk—Perkins
Pet—Peters Mach. Co.
Pfx—Perfex Radiator
Phil—Philadelphia
Phro—Pharo Mfg. Co.
Prsh—Parish Mfg. Co.
Prud—Prudden
Rayfld—Rayfield
Rem—Remy
Rowl—Wm. H. Rowland
Roy—Royer Wheel Co.
R-T—Rome-Turney
Rugl—Ruggles
Rus—Russel Car & Frdy.
Russl—Russel Axle Co.
Rut—Rutenber
R&V—Root & VanDervoort
Sag—Saginaw
Sal—Salisbury
Savg—Savage Arms
Sch—Schwarz Wheel Co.
Schblr—Schebler
Shel—Sheldon
Simp—Simplex
S-J—Shotwell-Johnson
S-M—Standard Malleable
Smh—A. O. Smith
Sth—Smith Steel Wheel
S-P—Standard Parts Co.
Spltf—Splitdorf
Sp-P—Spring Perch Co.
Stan—Standard Radiator
Stand—Standard Steel Spring Co.
Sterl—Sterling Bearings
Stmbg—Stromberg
Stn—Standard Wheel Co.
S-W—Sparks-Withington
Sum—Sumter Elec. Co.
Therm—Thermoid
Timkn—Timken
Torbn—Torbensen
Tuth—Tuthill
Univl—Universal Prdts
Unv—Universal
Unvsl—Universal Mach.
U. S.—U. S. Spring Co.
Wag—Wagner
Warn—Warner
Wau—Waukesha
West—Westinghouse
Wil-B—Wilcox Bennett
Wis—Wisconsin Parts
W-L—Ward-Leonard
W&L—Waterhouse & Lester Co.
Way—Wayne Wheel Co.
Wol—Wohlrab
Wsc—Wisconsin
Yng—Youngstown Pressed Steel Co.

Detailed Technical Specifications of

Name and Model	Tons Capacity	Chassis Price	Wheelbase, Inches	FRAME: Make	FRAME: Materia	FRAME: Type	TIRES: Kind	TIRES: Size in Ins. Front	TIRES: Size in Ins. Rear	WHEELS: Make	WHEELS: Type	ENGINE: Make	ENGINE: No. Cyl. Bore and Stroke—N.A.C.C. Hp.	ENGINE: Cylinders Cast	COOLING: Water Circ.	COOLING: Radiator CASE Make	COOLING: Radiator CASE Type	COOLING: Radiator CORE Make	COOLING: Radiator CORE Type	IGNITION: Type	IGNITION: Make	IGNITION: Spark Advance	ELEC. SYSTEM: Type	ELEC. SYSTEM: Make	ELEC. SYSTEM: Extra Cost $
Independent (Iowa)...E	1½	$1,890	135	own...	rol-c..	rigid..	sol*...	34x3½	34x5	Prud..	wd....	Con...	4-3½x5 -22.5	4	cent...	Chgo..	cst.....	Chgo..	cel.....	sing...	Bosch.	fixed..	none..	none..	none
Independent (Iowa)...F	2	2,290	146	own...	rol-c..	rigid..	sol*...	34x4	34x6	Prud..	wd....	Con...	4-4½x5½-27.2	4	cent...	Chgo..	cst.....	Chgo..	cel.....	sing...	Bosch.	fixed..	none..	none..	none
Independent (Ohio)...F	1	1,685	128	P&B..	p-stl..	s-flex..	sol*...	34x3½	34x4	Way*.	wd*...	Con...	4-3½x5 -19.6	4	ther...	Natl..	sht.....	Natl..	zz-t.....	sing...	Eismn.	fixed..	lghtg..	Exide.	none
Independent (Ohio)...G	2	2,500	144	P&B..	p-stl..	s-flex..	sol*...	34x4	34x6	Ind...	mt....	Con...	4-4½x5½-27.2	4	cent...	Yng...	prs.....	Lng..	fin.....	sing...	Eismn.	fixed..	lghtg..	Exide.	none
Indiana.....12	1½	2,300	134	own...	rol-c..	s-flex..	sol*...	34x3½	34x5	Bim...	wd....	Wau..	4-3½x5½-22.5	4	cent...	Lng...	cst.....	Lng..	fin.....	sing...	Eismn.	hand..	s&l-2*	West..	175
Indiana.....20	2	2,950	150	own...	rol-c..	s-flex..	sol*...	36x4	36x7	Bim...	wd....	own...	4-4½x5½-27.2	2	cent...	Lng...	cst.....	Lng..	fin.....	sing...	Eismn.	hand..	s&l-2*	West..	175
Indiana.....25	2½	3,150	156	own...	rol-c..	s-flex..	sol*...	36x4	36x8	Bim...	wd....	own...	4-4½x5½-27.2	2	cent...	Lng...	cst.....	Lng..	fin.....	sing...	Eismn.	hand..	s&l-2*	West..	175
Indiana.....35	3½	3,750	160	own...	rol-c..	s-flex..	sol*...	36x5	36x5d	Sth...	mt....	own...	4-4½x5½-30.6	2	cent...	Lng...	cst.....	Lng..	fin.....	sing...	Eismn.	hand..	s&l-2*	West..	175
Indiana.....50	5	4,800	170	own...	rol-c..	s-flex..	sol*...	36x5	40x6d	Sth...	mt....	Wau..	4-4½x6½-36.1	2	cent...	Lng...	cst.....	Lng..	fin.....	dual..	Eismn.	hand..	s&l-2*	West..	175
Inland.....C	1½	1,950	136	.....	rol-c..	.....	p&s...	34x4	34x5	.....	wd....	.....	4-3½x4½-22.5		ther...	.....	sht.....	.....	.....	.....	Bosch.	.....	s&l-2..	Dneto.	none
Inland.....D	2	2,850	132	.....	rol-c..	.....	.....	34x5	34x6	Bim...	wd....	ws...	4-4 x5 -25.6		.....	Lng..	.....	Lng..	fin.....	.....	Spltf..	.....	none..	none..	none
I. H. C.....F	1	1,850	128	P&B..	p-stl..	s-flex..	sol....	36x3½	36x4	opt...	wd....	own...	4-3½x5½-19.6	4	cent...	MeC*.	prs.....	MeC*.	fin.....	sing...	Bosch.	hand..	s&l*...	N-E...	131
I. H. C.....K	1½	2,200	128	P&B..	p-stl..	s-flex..	sol....	36x3½	36x5	opt...	wd....	own...	4-3½x5½-19.6	4	cent...	MeC*.	prs.....	MeC*.	fin.....	sing...	Bosch.	hand..	s&l*...	N-E...	131
I. H. C.....G	2	2,600	138	P&B..	p-stl..	s-flex..	sol....	36x4	36x6	opt...	wd....	own...	4-4 x5 -25.6	4	ther...	own...	prs.....	own..	fin.....	sing...	Sltf..	hand..	s&l*...	N-E...	131
I. H. C.....L	3½	.....	160	P&B..	p-stl..	s-flex..	sol....	36x5	40x10	opt...	wd....	own...	4-4½x5 -29.0	4	ther...	own...	prs.....	own..	fin.....	sing...	Sltf..	hand..	s&l*...	N-E...	.....
Jackson.....C-1920	3½	4,250	150	Cas...	p-stl..	rigid..	sol....	36x7	36x7	Stn...	wd....	Con...	4-4½x5½-32.4	2	cent...	Lug...	cst.....	Lng..	fin.....	sing...	Eismn.	hand..	sl&i-2.	Eismn.	none
Kearns.....H	¾	1,350	118	Prsh..	p-stl..	rigid..	pnu...	31x4	31x4	E&O..	wd....	Lght..	4-3½x4½-16.9	4	ther...	G&O..	prs.....	G&O..	fin.....	sing...	Berlg..	hand..	sl&i-2.	Dneto.	none
Kearns.....N	1½	2,000	136	P&B..	p-stl..	rigid..	sol....	34x3½	34x6	E&O..	wd....	H-S..	4-3½x5 -19.6	4	ther...	Bush..	cst.....	Bush..	fin.....	sing...	Berlg..	hand..	s&l-2..	Dneto.	none
Keidon.....19	2	2,885	144	own...	rol-c..	flex...	sol....	36x4	36x7	Sth...	mt....	Buda..	4-4½x5½-29.0	4	cent...	own...	cst.....	Eurk..	cel.....	sing...	Eismn.	hand..	none..	none..	none
Kelly-Springfield..K-31	1½	3,000	144	own...	p-stl..	flex...	sol....	36x3½	36x6	Crn...	wd....	own...	4-3½x5½-22.5	4	cent...	Fed...	sht.....	Fed..	cel.....	sing...	Eismn.	fixed..	sl&i-2*	West*	....
Kelly-Springfield..KS-32	1½	3,000	144	own...	p-stl..	flex...	sol....	36x3½	36x6	Crn...	wd....	own...	4-3½x5½-22.5	4	cent...	Fed...	sht.....	Fed..	cel.....	sing...	Eismn.	fixed..	sl&i-2*	West*.	....
Kelly-Springfield..K-35	2½	3,500	144	own...	p-stl..	flex...	sol....	36x4	36x4d	Crn...	wd....	own...	4-3½x5½-22.5	4	cent...	Fed...	sht.....	Fed..	cel.....	sing...	E s n.	fixed..	sl&i-2*	West*	....
Kelly-Springfield..KS-36	2½	3,500	144	own...	p-stl..	flex...	sol....	36x4	36x4d	Crn...	wd....	own...	4-3½x5½-22.5	4	cent...	Fed...	sht.....	Fed..	cel.....	sing...	Eismn.	fixed..	sl&i-2*	West*.	....
Kelly-Springfield..K-40	3½	4,400	150	own...	p-stl..	flex...	sol....	36x5	40x5d	Crn...	wd....	own...	4-4½x6½-32.4	2	cent...	Long..	sht.....	Long..	fin.....	sing...	Eismn.	fixed..	sl&i-2*	West*.	....
Kelly-Springfield..K-45	4	4,550	150	own...	p-stl..	flex...	sol....	36x5	40x6d	Crn...	wd....	own...	4-4½x6½-32.4	2	cent...	Lon...	sht.....	Long..	fin.....	sing...	Eismn.	fixed..	sl&i-2*	West*.	....
Kelly-Springfield..K-50	5	5,150	150	own...	p-stl..	flex...	sol....	36x6	40x6d	Crn...	wd....	own...	4-4½x6½-32.4	2	cent...	Long..	sht.....	Long..	fin.....	sing...	Eismn.	fixed..	sl&i-2*	West*.	....
Kelly-Springfield..K-60	6	5,500	150	own...	p-stl.	flex...	sol....	26x6	40x7d	Crn...	wd....	own...	4-4½x6½-32.4	2	cent...	Long..	sht.....	Long..	fin.....	sing...	Eismn.	fixed..	sl&i-2*	West*.	....
Keystone.....40	2	2,200	144	own...	rol-c..	s-flex..	p&s...	35x5	36x6	Way..	wd....	own...	4-4½x5½-32.5	2	ther...	MeC..	cst.....	MeC..	fin.....	sing...	Berlg..	hand..	none..	none..	none
Kimball.....AB	2	3,675	144	Prsh..	p-stl..	flex...	pnu*..	36x5	36x7	Sth...	mt....	Wau..	4-4 x6 -25.6	4	cent...	Flx...	prs.....	Flx..	cel.....	sing...	Eismn.	hand..	lghtg..	Splf..	none
Kimball.....AC	2½	3,975	159	Prsh..	p-stl..	flex...	pnu*..	36x6	38x7	Sth...	mt....	Wau..	4-4½x6 -29.0	4	cent...	Flx...	prs.....	Flx..	cel.....	sing...	Eric...	hand..	lghtg..	Splf..	none
Kimball.....AK	3	4,475	159	Prsh..	p-stl..	flex...	sol*...	36x4	36x10	Sth...	mt....	Wau..	4-4½x6 -32.4	4	cent...	Flx...	prs.....	Flx..	cel.....	sing...	Eismn.	hand..	lghtg..	Splf..	none
Kimball.....AE	4	4,975	170	Prsh..	p-stl..	flex...	sol....	36x5	40x10	Sth...	mt....	Wau..	4-4½x6 -36.2	2	cent...	Flx...	prs.....	Flx..	cel.....	sing...	Eismn.	hand..	lghtg..	Splf..	.90
Kimball.....AF	5	5,975	170	Prsh..	p-stl..	flex...	sol....	36x6	40x12	Sth...	mt....	Wau..	4-5 x6 -40.0	2	cent...	Flx...	prs.....	Flx..	cel.....	t-p...	Eric...	hand..	lghtg..	Splf..	.90
Kissel.....Delivery	¾	1,875	135	Smh..	p-stl..	flex...	pnu...	34x4½	34x4½	Prud..	wd....	own...	4-3½x5½-24.2	4	cent...	MeC..	sht.....	Fed..	cel.....	sing...	Eismn.	hand..	none..	none..	none
Kissel.....Utility	1½	2,275	152	Smh..	p-stl..	flex...	sol....	36x3½	36x5	Prud..	wd....	own...	4-3½x5½-24.2	4	cent...	MeC..	cst.....	MeC..	fin.....	sing...	Eismn.	hand..	none..	none..	none
Kissel.....Freighter	2	2,975	168	Smh..	p-stl..	flex...	sol*...	36x4	36x7	Prud..	wd....	own...	4-4½x5½-29.0	4	cent...	MeC..	cst.....	MeC..	fin.....	sing...	Eismn.	hand..	none..	none..	none
Kissel.....Heavy Duty	3½	3,975	168	Smh..	p-stl..	flex...	sol*...	36x5	36x5d	Sth...	mt....	own...	4-4½x5½-29.0	4	cent...	MeC..	cst.....	MeC..	fin.....	sing...	Eismn.	hand..	none..	none..	none
Kleiber.....AA	1	2,400	130	own...	rol-c..	s-flex..	sol*...	34x3½	34x5	W&L.	wd....	Con...	4-3½x5½-22.5	4	cent...	Pfx...	sht.....	Pfx..	cel.....	sing...	Bosch.	hand..	none..	none..	none
Kleiber.....A	1½	2,800	143	own...	rol-c..	s-flex..	sol....	36x3½	36x6	W&L.	wd....	Con...	4-4½x5½-27.2	4	cent...	Pfx...	sht.....	Pfx..	cel.....	sing...	Bosch.	hand..	none..	none..	none
Kleiber.....BB	2	3,200	153	own...	rol-c..	s-flex..	sol....	36x4	36x7	W&L.	wd....	Con...	4-4½x5½-27.2	4	cent...	Pfx...	sht.....	Pfx..	cel.....	sing...	Bosch.	hand..	none..	none..	none
Kleiber.....B	2½	3,800	160	own...	rol-c..	s-flex..	sol....	36x5	36x8	W&L.	wd....	Con...	4-4½x5 -32.4	2	cent...	own...	cst.....	R-T...	fin.....	sing...	Bosch.	hand..	none..	none..	none
Kleiber.....C	3½	4,400	163	own...	rol-c..	s-flex..	sol....	36x5	36x10	W&L.	wd....	Con...	4-4½x5 -32.4	2	cent...	own...	cst.....	R-T...	fin.....	sing...	Bosch.	hand..	none..	none..	none
Kleiber.....D	5	5,300	180	own...	rol-c..	s-flex..	sol....	36x6	40x12	Sth...	mt....	Con...	4-5½x5½-44.2	2	cent...	own...	cst.....	R-T...	fin.....	sing...	Bosch.	hand..	none..	none..	none
Knox.....35-Tractor	....	5,500	108½	own...	rol-c..	s-flex..	sol....	36x5	38x6d	Way..	wd....	own...	4-5 x5½-40.0	2	cent...	Fed...	sht.....	Fed..	cel.....	sing...	Eismn.	hand..	s&l-2..	G&D..	none
Koehler.....C	1½	1,885	131	P&B..	p-stl..	s-flex..	sol....	34x3	34x5	Way..	wd....	H-S..	4-3½x5 -19.6	4	ther...	own...	cst.....	Lng..	fin.....	sing...	Eismn.	fixed..	s&l-2..	.....	.....
Koehler.....M	2½	3,165	162	P&B..	p-stl..	s-flex..	sol....	36x4	36x7	Way..	wd....	Her...	4-4 x5½-25.6	4	cent...	own...	cst.....	Lng..	fin.....	sing..	Eismn.	fixed..	s&l-2..	.....	.....
Lange.....B	2	2,950	136	own...	rol-c..	rigid..	sol....	36x4	36x6	H&D.	wd....	Con...	4-4½x5½-27.2	4	ther...	own...	sht.....	own..	sq-t.....	sing...	Bosch.	hand..	none..	none..	none
Larrabee.....U	1½	2,250	138	Savg..	p-stl..	flex...	sol....	34x3½	34x5	H&D.	wd....	Con...	4-3½x5 -22.5	4	ther...	own...	cst.....	Bush..	fin.....	sing...	Bosch.	hand..	lghtg..	Eismn.	125
Larrabee.....C	2½	3,250	152	Savg..	p-stl..	flex...	sol....	36x4	36x7	H&D.	wd....	Con...	4-4½x5½-27.2	4	cent...	own...	cst.....	Bush..	fin.....	sing...	Bosch.	hand..	lghtg..	Eismn	125
Larrabee.....A&B	3½	4,000	154	Savg..	p-stl..	flex...	sol....	36x5	36x5d	H&D.	wd....	Con...	4-4½x5½-32.4	2	cent...	own...	cst.....	Bush..	fin.....	sing...	Bosch.	hand..	lghtg..	Eismn.	125
Larrabee.....T	5	4,900	178	Savg..	p-stl..	flex...	sol....	36x6	40x6d	Sth...	mt....	Con...	4-4½x5 -32.4	2	cent...	own...	cst.....	Bush..	fin.....	s ng...	Bosch.	hand..	none..	none..	none
L. M. C.....2-20	2½	2,950	164	FAC..	rol-c..	s-flex..	sol....	36x4	36x4d	Bim...	wd....	Con...	4-4½x5½-27.2	4	cent...	Lng...	cst.....	Lng..	fin.....	sing...	Bosch.	hand..	sl&i-2.	Remy.	.....
Loyal.....	¾	950	110	P&B..	p-stl..	flex...	pnu...	32x4	32x5	Bim...	wd....	LeR..	4-3½x4½-15.6	4	ther...	Fed...	prs.....	Fed..	pln.....	dual..	A-Knt	auto..	sl&i-2.	W-L..	none
Loyal.....Special	¾	1,245	120	P&B..	p-stl..	flex...	pnu...	32x4½	32x4½	Bim...	wd....	H-S..	4-3½x5 -16.9	4	ther...	Fed...	cst.....	Fed..	pln.....	sing...	A-Knt	auto..	sl&i-2.	.....	none
Loyal.....	1	1,500	130	P&B..	p-stl..	flex...	pnu...	33x5	33x5	Bim...	wd....	H-S..	4-3½x5 -16.9	4	ther...	Fed...	cst.....	Fed..	pln.....	sing...	A-Knt	auto..	sl&i-2.	W-L..	none
Maccar.....b	1½	2,750	150	Prsh..	p-stl..	rigid..	sol....	36x4	36x5	Sch...	wd....	Con...	4-4½x5½-27.2	4	cent...	own...	cst.....	Bush..	fin.....	sing...	Bosch.	hand..	opt....	opt.....	.....
Maccar.....H	2½	3,500	162	Prsh..	p-stl..	rigid..	sol....	36x4	36x4d	Sch...	wd....	Con...	4-4½x5½-32.4	2	cent...	own...	cst.....	Bus...	fin.....	sing...	Bosch.	hand..	opt....	opt.....	.....
Maccar.....M	3½	4,300	174	Prsh..	p-stl..	rigid..	sol....	36x5	36x5d	Sch...	wd....	Con...	4-4½x5½-32.4	2	cent...	own...	cst.....	Bush..	fin.....	sing...	Bosch.	hand..	opt....	opt.....	.....
Maccar.....G	5	5,250	186	Prsh..	p-stl..	rigid..	sol....	36x5	40x6d	Day..	mt....	Con...	4-4½x6 -36.2	2	cent...	own...	cst.....	Bush..	fin.....	sing...	Bosch.	hand..	opt....	opt.....	.....
Mack.....AB	1½	3,000	144	own...	p-stl..	flex...	sol....	36x4	36x3½d	Sch...	wd....	own...	4-4 x5 -25.6	2	cent...	own...	sht.....	own..	cel.....	sing...	Spltf..	hand..	lhtg-2*	L-N...	175*
Mack.....AB	1½	3,000	144	own...	p-stl..	flex...	sol....	36x4	36x3½d	Sch...	wd....	own...	4-4 x5 -25.6	2	cent...	own...	sht.....	own..	cel.....	sing...	Spltf..	hand..	lhtg-2*	L-N...	175*

ABBREVIATIONS—Types of Construction

*****—other options
amid—amidship
auto—automatic
bevl—bevel
cel—cellular
cent—centrifugal
chn—chain
cst—cast
ctr—center
cylinders cast, 2 in pairs
cylinders cast, 4 in block
cylinders cast, 3 in threes
cylinders cast, 1 singly
cyl-ends—cylinder-ends
d—dual
d-d—dry-disk
d-p—dry-plate
dplx—from both motor & driveshaft
d-rd—double reduction
d-s—drive-shaft
elec—electric
ext-d-s—external drive-shaft
ext-f-w—external front wheel
ext-g—external gear
ext-jst—external jack-shaft
ext-r-w—external rear wheel
fab—fabric
fin—finned tube
flex—flexible
fric—friction
g-p—gear pump
grv—gravity
gset—from gearset
hyd—hydraulic
ind-c—individual clutch
int-g—internal gear
int-g-4—internal gear drive on 4 wheels
int-r-w—internal rear wheel
jst—unit with jackshaft
l—left
l-b—loose ball
lghtg—lighting only
motr—unit with motor
mt—metal (wheels)
mtl—metal (universal joint)
opt—optional
pist—piston pump
plan—planetary
pln—plain tube
pnu—pneumatic
pres—pressure
prog—progressive
prs—pressed steel
p&s—pneumatics in front, solids in rear
p-stl—pressed steel
r—right
r&c—right & center
r-rd—radius rods
rol-c—rolled channel
rol-i—rolled I-beam
selec—selective
s-flex—semi-flexible
sht—sheet
s&l—starting & lighting
sl&i-2—starting, lighting & ignition, 2 unit
sol—solid
sprgs—springs
sq-t—square-tube
start—starting only
t-arm—torque arm
ther—thermo-syphon
t-p—two-point
t-t—torsion tube
vac—vacuum
wat-tube—water tube
wd—wood
w-d—multiple disk in oil
w-p—plate in oil
wr—wire
zz-t—zig-zag tube

ABBREVIATIONS—Makers of Parts

*Other Options
Acme—Acme Universal Joint Mfg. Co.
A-Knt—Atwater-Kent
Al-Ch—Allis-Chalmers
Aloy—Alloy Steel Spring
Amer—American Magneto Co.
Arch—Archibald
Arvac—Arvac Co.
Aut-L—Auto-Lite
Auto—Auto-Wheel Co.
A-W-W—Automotive Wire Wheel Co.
B&B—Ball & Ball
B-Beck—Borg & Beck
Berlg—Berling
Bet—Betts Spring Co.
Bim—Bimel
B-Lipe—Brown-Lipe
Blood—Blood Bros.
Brem—Bremer
Bvr—Beaver Mfg. Co.
B&W—B & W Mfg. Co.
Can—Candler Radiator
Cant—Canton-Cleveland
Carl—Carleton Co.
Cart—Carter Carburetor
Cas—G. M. Castle
CAS—C. A. S. Products
Chgo—Chicago Mfg. Co.
Chic—Chicago-Standard
Chmp—Champion Auto Spring Co.
Chy—Cheney
Clrk—Clark Equipment
Col—Columbia Axle Co.
Con—Continental Motor
Conn—Connecticut
Crn—Crane & Mac-Mahon Co.
C-S—Christopher Simpson Iron Co.
Day—Dayton
Del—Delaney
Detlaf—Detlaff

Gasoline Motor Trucks for 1920—Cont.

ENGINE										TRANSMISSION											BRAKES		CONTROL			UNIVERSALS		Name and Model
GOVERNOR			SPEED		FUEL SYS.		CLUTCH			GEARSET				FINAL DRIVE									STEERING GEAR					
Type	Make	Drive	Motor in r.p.m.	Truck in m.p.h.	Carbureter Make	Fuel Feed	Type	Make		Type	Make	Placed	Speeds	Type	Rear Axle Make	Total Gear Reduction	Propulsion Taken By	Torque Taken By		Springs Make	Foot	Hand	Placed	Make	Levers	Type	Make	
none.	none...	none..	.....	....	Stmbg.	vac...	d-d...	Fuller..		selec...	Fuller..	motr..	3	int-g..	Russl..	.....	sprgs..	sprgs..		GCS..	ext-r-w..	int-r-w..	l...	Lavn..	ctr..	mtl..	Blood..	Independent (Iowa)...E
none.	none...	none..	.....	....	.....	vac...	d-d...	Fuller..		selec...	Fuller..	motr..	3	int-g..	Russl..	.....	sprgs..	sprgs..		GCS..	ext-r-w..	int-r-w..	l...	Lavn..	ctr..	mtl...	Blood..	Independent (Iowa)...F
suct..	Mnrch..	motor	.....	....	Zenith.	grv...	d-d...	Fuller..		selec...	Fuller..	motr..	3	worm.	Chic...	7.75	sprgs..	sprgs..		Iron..	int-r-w..	int-r-w..	l...	.....	ctr..	mtl..	Sterl..	Independent (Ohio)...F
suct..	Mnrch.	motor	.....	....	Zenith.	grv...	d-d...	Fuller..		selec...	Fuller..	motr..	3	worm.	Wis....	9.66	sprgs..	sprgs..		Iron..	int-r-w..	int-r-w..	l...	Wol...	ctr..	mtl..	Sterl..	Independent (Ohio)...G
cent.	Wau...	motor	1300	17	Stmbg.	grv...	d-p...	B-Beck.		selec...	Covert.	amid..	3	worm.	Shel....	7.80	r-rd...	sprgs.		Shel..	int-r-w..	int-r-w..	l...	Wol...	ctr..	mtl..	Acme..	Indiana.....12
cent.	Pierce..	motor	1150	16	Stmbg.	grv...	d-p...	B-Beck.		selec...	B-Lipe.	amid..	4	worm.	Shel....	7.75	r-rd...	sprgs..		Shel..	int-r-w..	int-r-w..	l...	Wol...	ctr..	mtl..	Acme..	Indiana.....20
cent.	Pierce..	motor	1160	15	Stmbg.	grv...	d-p...	B-Beck.		selec...	B-Lipe.	amid..	4	worm.	Shel....	7.75	r-rd...	sprgs..		Shel..	int-r-w..	int-r-w..	l...	Wol...	ctr..	mtl..	Acme..	Indiana.....25
cent.	Pierce..	motor	1150	12	Stmbg.	grv...	d-p...	B-Beck.		selec...	B-Lipe.	amid..	4	worm.	Shel....	10.25	r-rd...	sprgs..		Shel..	int-r-w..	int-r-w..	l...	Wol...	ctr..	mtl..	Spicer..	Indiana.....35
cent.	Wau...	motor	800	11	Stmbg.	grv...	d-p...	B-Beck.		selec...	B-Lipe.	amid..	4	worm.	Shel....	8.75	r-rd...	sprgs..		Shel..	int-r-w..	int-r-w..	l...	Wol...	ctr..	mtl..	Spicer..	Indiana.....50
.....	.....	.....	.....	....	Schblr..	.....	.....	.....		selec...	Detrt..	motr..	3	int-g..	Torbn..	.....	.....	.....		.....	ext-r-w..	int-r-w..	.....	.....	.....	.....	.....	Inland.....C
.....	.....	.....	.....	....	Zenith.	.....	d-p...	.....		.....	Fuller..	motr..	...	int-g..	Torbn..	.....	.....	.....		Mth..	.....	.....	.....	Lavn..	.....	.....	.....	Inland.....D
cent.	own...	motor	1275	17	Ens...	grv...	d-d...	own...		selec...	own...	amid..	3	int-g..	own....	7.91	sprgs..	sprgs..		Stand.	int-r-w..	int-r-w..	l...	own...	ctr..	mtl..	own...	I. H. C.....F
cent.	own...	motor	1275	15	Ens...	grv...	d-d...	own...		selec...	B-Lipe.	amid..	4	int-g..	own....	8.96	sprgs..	sprgs..		Stand.	int-r-w..	int-r-w..	l...	own...	ctr..	mtl..	own...	I. H. C.....K
cent.	own...	motor	1100	13	Ens...	grv...	d-d...	own...		selec...	B-Lipe.	amid..	4	int-g..	own....	8.96	sprgs..	sprgs..		Stand.	int-r-w..	int-r-w..	l...	own...	ctr..	mtl..	own...	I. H. C.....G
cent.	own...	motor	1100	12	Ens...	grv...	d-d...	own...		selec...	B-Lipe.	amid..	4	int-g..	own....	10.98	sprgs..	sprgs..		Stand.	int-r-w..	int-r-w..	l...	own...	ctr..	mtl..	own...	I. H. C.....L
cent.	Pierce..	motor	1000	12	Stmbg.	vac...	d-p...	B-Beck.		selec...	own...	amid..	4	bevl-4	own....	9.18	sprgs..	sprgs..		S-P...	int-r-w..	ext-d-s	r...	Ross..	r...	mtl..	Spicer..	Jackson.....C-1920
suct..	Mnrch.	motor	1000	25	Zenith.	grv...	d-p...	B-Beck.		selec...	G-Lees.	motr..	3	int-g..	Torbn..	6.00	sprgs..	sprgs..		Mth..	int-r-w..	ext-r-w	l*...	Lavn..	ctr..	mtl..	Peters.	Kearns.....H
suct..	Mnrch.	motor	.....	20	Zenith.	grv...	d-p...	B-Beck.		selec...	G-Lees.	motr..	3	int-g..	Torbn..	8.00	sprgs..	sprgs..		Mth..	int-r-w..	int-r-w..	l*...	Lavn..	ctr..	mtl..	Peters.	Kearns.....N
cent.	Pierce..	motor	1200	17	Stmbg.	grv...	d-d...	Fuller..		selec...	Fuller..	motr..	4	int-g..	Russl..	7.40	sprgs..	sprgs..		Chmp	ext-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Univl..	Keldon.....19
cent.	Pierce..	motor	1400	17	Zenith.	grv...	cone..	own...		selec...	Covert.	amid..	3	chn..	own....	8.66	r-rd...	t-t....		S-P...	int-r-w..	int-r-w..	l...	Gem..	l&c.	mtl..	own...	Kelly-Springfield..K-31
cent.	Pierce..	motor	1400	17	Zenith.	grv...	cone..	own...		selec...	Covert.	amid..	3	worm.	Shel....	8.66	r-rd...	t-t....		S-P...	int-r-w..	int-r-w..	l...	Gem..	l&c.	mtl..	Spicer..	Kelly-Springfield..KS-32
cent.	Pierce..	motor	1400	14	Zenith.	grv...	cone..	own...		selec...	Covert.	amid..	3	chn..	own....	10.64	r-rd...	t-t....		S-P...	int-r-w..	int-r-w..	l...	Gem..	l&c.	mtl..	own...	Kelly-Springfield..K-35
cent.	Pierce..	motor	1400	14	Zenith.	grv...	cone..	own...		selec...	Covert.	amid..	3	worm.	Shel....	10.33	r-rd...	t-t....		S-P...	int-r-w..	int-r-w..	l...	Gem..	l&c.	mtl..	Spicer..	Kelly-Springfield..KS-36
cent.	Pierce..	motor	1400	16	Rayfld.	grv...	cone..	own...		selec...	Covert.	amid..	3	chn..	own....	10.48	r-rd...	t-t....		S-P...	int-r-w..	int-r-w..	l...	Gem..	l&c.	mtl..	own...	Kelly-Springfield..K-40
cent.	Pierce..	motor	1400	16	Rayfld.	grv...	cone..	own...		selec...	Covert.	amid..	3	chn..	own....	10.71	r-rd...	t-t....		S-P...	int-r-w..	int-r-w..	l...	Gem..	ctr..	mtl..	own...	Kelly-Springfield..K-45
cent.	Pierce..	motor	1400	13	Rayfld.	grv...	cone..	own...		selec...	Covert.	amid..	3	chn..	own....	12.24	r-rd...	t-t....		S-P...	int-r-w..	int-r-w..	l...	Gem..	l&c.	mtl..	own...	Kelly-Springfield..K-50
cent.	Pierce..	motor	1400	13	Rayfld	grv...	cone..	own...		selec...	Covert.	amid..	3	chn..	own....	12.39	r-rd...	t-t....		S-P...	int-r-w..	int-r-w..	l...	Gem..	l&c.	mtl..	own...	Kelly-Springfield..K-60
cent.	Pierce..	motor	1350	17	Zenith.	grv...	d-d...	Fuller..		selec...	Fuller..	motr..	3	int-g..	Russl..	8.90	sprgs..	sprgs..		Rowl..	ext-r-w..	int-r-w..	l...	Ditdw	ctr..	mtl..	Spicer..	Keystone.....40
cent.	Dplx...	dplx..	1600	18	Zenith.	vac...	d-d...	B-Lipe.		selec...	B-Lipe.	amid..	4	worm.	Shel....	6.50	sprgs..	sprgs..		U.S..	int-r-w..	int-d-s	l...	Ross..	ctr..	mtl..	Spicer..	Kimball.....AB
cent.	Dplx...	dplx.	1600	17	Zenith.	vac...	d-d...	B-Lipe.		selec...	B-Lipe.	amid..	4	worm.	Shel....	7.75	sprgs..	sprgs..		U.S..	int-r-w..	ext-d-s	l...	Ross..	ctr..	mtl..	Spicer..	Kimball.....AC
cent.	Dplx...	dplx.	1250	16	Zenith.	vac...	d-d...	B-Lipe.		selec...	B-Lipe.	amid.	4	worm.	Shel....	7.75	sprgs..	sprgs..		U.S..	int-r-w..	ext-d-s	l...	Ross..	ctr..	mtl..	Spicer..	Kimball.....AK
cent.	Dplx...	dplx..	1400	14	Zenith.	vac...	d-d...	Fuller..		selec...	Fuller..	amid.	4	worm.	Shel....	8.75	sprgs..	sprgs..		U.S..	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Spicer..	Kimball.....AE
cent.	Dplx...	dplx..	1400	12	Zenith.	vac...	d-d...	Fuller..		selec...	Fuller..	amid.	4	worm.	Shel....	8.75	sprgs..	sprgs..		U.S..	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Spicer..	Kimball.....AF
cent.	Pierce..	motor	1200	25	Stmbg.	vac...	d-d...	Warn..		selec...	Warn..	motr..	3	bevel..	own....	5.00	sprgs..	sprgs..		Mth..	ext-r-w..	ext-r-w..	l...	Jacox.	ctr..	mtl..	Spicer..	Kissel.....Delivery
cent.	Pierce..	motor	1150	17	Stmbg.	vac...	d-d...	Warn..		selec...	Warn..	motr..	3	worm.	Shel....	7.80	sprgs..	sprgs..		Dtr..	int-r-w..	int-r-w..	l...	Jacox.	ctr..	mtl..	Spicer..	Kissel.....Utility
cent.	Pierce..	motor	1190	15	Stmbg.	vac...	d-d...	Warn..		selec...	Warn..	amid..	4	worm.	Timkn.	8.50	sprgs..	sprgs..		Mth..	int-r-w..	int-r-w..	l...	Lavn..	ctr..	mtl..	Spicer..	Kissel.....Freighter
cent.	Pierce..	motor	1315	12	Stmbg.	vac...	d-d...	Warn..		selec...	Warn..	amid..	4	worm.	Shel....	11.75	sprgs..	sprgs..		Shel..	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Spicer..	Kissel.....Heavy Duty
cent.	Pierce..	motor	1200	20	Stmbg.	grv...	d-d...	B-Lipe.		selec...	B-Lipe.	motr..	3	worm.	Timkn.	7.00	sprgs..	sprgs..		Bet...	int-r-w..	int-r-w..	r...	Ross..	ctr..	mtl..	Spicer..	Kleiber.....AA
cent.	Pierce..	motor	1200	18	Stmbg.	grv...	w-d...	M&E..		selec...	B-Lipe.	amid..	4	worm.	Shel....	7.75	sprgs..	sprgs..		Bet...	int-r-w..	int-r-w..	r...	Ross..	ctr..	mtl..	Spicer..	Kleiber.....A
cent.	Pierce..	motor	1200	18	Stmbg.	grv...	w-d...	M&E..		selec...	B-Lipe.	amid..	4	worm.	Timkn.	7.75	sprgs..	sprgs..		Bet...	int-r-w..	int-r-w..	r...	Ross..	ctr..	mtl..	Spicer..	Kleiber.....BB
cent.	Pierce..	motor	1200	18	Stmbg.	grv...	w-d...	M&E..		selec...	B-Lipe.	amid..	4	worm.	Shel....	7.75	sprgs..	sprgs..		Bet...	int-r-w..	int-r-w..	r...	Ross..	ctr..	mtl..	Spicer..	Kleiber.....B
cent.	Pierce..	motor	1200	17	Stmbg.	grv...	w-d...	M&E..		selec...	B-Lipe.	amid..	4	worm.	Timkn.	8.75	sprgs..	sprgs..		Bet...	int-r-w..	int-r-w..	r...	Ross..	ctr..	mtl..	Spicer..	Kleiber.....C
cent.	Pierce..	motor	1200	15	Stmbg.	grv...	w-d...	M&E..		selec...	B-Lipe.	amid..	4	worm.	Timkn.	11.66	r-rd...	sprgs..		Bet...	int-r-w..	int-r-w..	r...	Ross..	ctr..	mtl..	Spicer..	Kleiber.....D
none.	none...	none..	1000	9	Zenith.	vac...	d-p...	own...		selec...	own...	jst...	2	chn..	own....	.....	r-rd...	.....		.....	ext-jst..	int-r-w..	l...	Ross..	ctr..	mtl..	own...	Knox.....35-Tractor
cent.	Dplx...	motor	1250	18	Zenith.	grv...	d-d...	Mech..		selec...	Mech..	motr..	3	int-g..	Torbn..	7.00	sprgs..	sprgs..		Mth..	ext-r-w..	int-r-w..	l...	own...	ctr..	mtl..	Spicer.	Koehler.....C
cent.	Dplx...	motor	1225	14	Zenith.	grv...	d-d...	B-Lipe.		selec...	B-Lipe.	amid..	4	worm.	Timkn.	9.30	sprgs..	sprgs..		Mth..	int-r-w..	int-r-w..	l...	Lavn..	ctr..	mtl*.	Spicer*	Koehler.....M
cent.	Pierce..	motor	1250	15	Stmbg.	vac...	w-d...	M&E..		ind-e....	own...	amid..	3	chn...	own...	9.00	r-rd...	.....		Stand.	ext-r-w..	int-r-w..	l...	Gem..	ctr..	mtl..	M&E..	Lange.....B
cent.	Dupl x.	motor	1225	16	Schblr..	grv...	d-d...	B-Lipe.		selec...	B-Lipe.	motr..	3	worm.	Shel....	7.8	sprgs..	sprgs..		Merl..	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Unvsl..	Larrabee.....U
cent.	Dupl x.	motor	1200	15	Schblr..	grv...	d-d...	B-Lipe.		selec...	B-Lipe.	amid..	4	worm.	Shel....	8.75	sprgs..	sprgs..		Merl..	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Unvsl..	Larrabee.....C
cent.	Duplex.	motor	1000	12	Schblr..	grv...	d-d...	B-Lipe.		selec...	B-Lipe.	amid..	4	worm.	Shel....	8.75	sprgs..	sprgs..		Merl..	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Unvsl..	Larrabee.....A&B
cent.	Duplex.	motor	1000	10	Schblr..	grv...	d-d...	B-Lipe.		selec...	B-Lipe.	amid..	4	worm.	Shel....	11.75	sprgs..	sprgs..		Merl..	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Unvsl..	Larrabee.....T
cent.	Pierce..	motor	1150	14	Stmbg.	vac...	d-p...	B-Beck.		selec...	Detrt..	amid..	4	int-g..	Russl..	8.80	sprgs..	sprgs..		Mth..	ext-r-w..	int-r-w..	l...	Lavn..	ctr..	fab*.	Therm*	L. M. C.....2-20
.....	.....	.....	1000	30	Stmbg.	grv...	d-p...	B-Beck.		selec...	Covert.	motr..	3	int-g..	Torbn..	.....	sprgs..	sprgs..		.....	int-r-w..	ext-r-w..	l...	Ross..	ctr..	mtl..	Blood..	Loyal.....
.....	.....	.....	1000	30	Stmbg.	grv...	d-d...	B-Beck.		selec...	Covert.	motr..	3	int-g..	Torbn..	.....	sprgs..	sprgs..		.....	ext-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Blood..	Loyal.....Special
....	.....	.....	1000	20	Stmbg.	grv...	d-p...	B-Beck.		selec...	Covert.	motr..	3	int-g..	Torbn..	.....	sprgs..	sprgs..		.....	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Blood..	Loyal.....
cent.	Pierce..	motor	1200	18	Stmbg.	grv...	d-d...	B-Lipe.		selec...	B-Lipe.	motr..	3	worm.	Timkn.	7.00	r-rd...	sprgs..		Merl..	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Spicer..	Maccar.....L
cent.	Pierce..	motor	1200	16	Stmbg.	grv...	d-d...	B-Lipe.		selec...	B-Lipe.	motr..	3	worm.	Timkn.	7.75	r-rd...	sprgs..		Merl..	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Spicer..	Maccar.....H
cent.	Pierce..	motor	1200	15	Stmbg.	grv...	d-d...	B-Lipe.		selec...	B-Lipe.	motr..	3	worm.	Timkn.	8.75	r-rd...	sprgs..		Merl..	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Spicer..	Maccar.....M
cent.	Con...	motor	1050	12	Zenith.	grv...	d-d...	B-Lipe.		selec...	B-Lipe.	amid.	4	worm.	Timkn.	10.25	r-rd...	sprgs..		Merl..	int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Spicer..	Maccar.....G
cent.	own...	motor	1250	16	Zenith.	grv...	d-d...	B-Lipe.		selec...	B-Lipe.	motr..	4	worm.	Timkn.	8.50	sprgs..	sprgs..		Merl..	int-r-w..	int-r-w..	l...	own...	ctr..	mtl..	Spicer..	Mack.....AB
cent.	own...	motor	1250	20	Zenith.	grv...	d-d...	B-Lipe.		selec...	B-Lipe.	motr..	4	chn...	own....	6.99	r-rd...	.....		Merl..	ext-d-s..	int-r-w..	l...	own...	ctr..	mtl..	Blood..	Mack.....AB

ABBREVIATIONS—Makers of Parts—(Continued)—

Detrt—Detroit G. & M.
Ditw—Ditwiler Mfg. Co.
Dneto—Dyneto
Drt—Detroit Pressed Steel Co.
Dtp—Detroit Products
Dtrt—Detroit Lubricator
Dun—Dunbar Mfg. Co.
Durc—Durston Gear Corp.
E&M—English & Mersick
E&O—Eberly & Orris
Eismn—Eisemann
Ens—Ensign Carburetor
Eric—Ericsson Mfg. Co.
Eurk—Eureka
F&H—French & Hecht
FAC—F. A. Chapper
Fed—Fedders
Flx—Flexo Mfg. Co.
Frank—Francke Co.
G&D—Gray & Davis
G&O—G & O Mfg. Co.
GCS—Garden City Springs
Gem—Gemmer
G-Lees—Grant-Lees
Grn—Greens Car Wheel
H&D—Hoopes Bros. & Darlington
Har—Harrison
Hart—Hartford
Harv—Harvey
Hay—Hayes Wheel Co.
Her—Hercules
Hig—Higgins
Hink—Hinkley
Hol—Holley
H-Shaw—Hele-Shaw
H-S—Herschell-Spillman
Hyd—Hydraulic
Idl—Ideal
Ind—Indestructible
Iron—Iron City
Jacox—Jackson-Church-Wilcox
Jck—Jackson Auto
Jns—Phineas Jones & Co.
John—Johnson Co.
Kal—Kalamazoo
Kel—Kelsey Wheel Co.
Ken—Kenosha Wheel & Darlington
Knz—Kuntz
Lavn—Lavine
LeR—Le Roi
Lght—Light Mfg. Co.
L-N—Leece-Neville Co.
Lng—Long
Lvgn—Livingston
Lyc—Lycoming
Marvl—Marvel
Mas—F. C. Mason & Co.
Mast—Master
McCn—McCanna
M&E—Merchant & Evans
McC—McCord
Mech—Mechanics Mach. Co.
Merl—Merrill Spring Co.
Miller—H. A. Miller
Mnrch—Monarch
Mod—Modine Mfg. Co.
Mot—Mott Wheel Wks.
M-R—Marlin-Rockwell
MSC—Massillon
Mth—Mather
Mut—Mutual Wheel Co.
Nat—National Spring
Natl—National Can Co.
N-E—North East
Nich—Nichols Elec. Co.
P&B—Parish & Bingham
Perk—Perkins
Pet—Peters Mach. Co.
Pfx—Perfex Radiator
Phil—Philadelphia
Phro—Pharo Mfg. Co.
Prsh—Parish Mfg. Co.
Prud—Prudden
Rayfld—Rayfield
Rem—Remy
Rowl—Wm. H. Rowland
Roy—Royer Wheel Co.
R-T—Rome-Turney
Rugl—Ruggles
Rus—Russel Car & Frdy.
Russl—Russel Axle Co.
Rut—Rutenber
R&V—Root & VanDervoort
Sag—Saginaw
Sal—Salisbury
Savg—Savage Arms
Sch—Schwarz Wheel Co.
Schblr—Schebler
Shel—Sheldon
Simp—Simplex
S-J—Shotwell-Johnson
S-M—Standard Malleable
Smh—A. O. Smith
Sth—Smith Steel Wheel
S-P—Standard Parts Co.
Splf—Splitdorf
Sp-P—Spring Perch Co.
Stan-St—Standard Radiator
Stand—Standard Steel Spring Co.
Sterl—Sterling Bearings
Stmbg—Stromberg
Stn—Standard Wheel Co.
S-W—Sparks-Withington
Sum—Sumter Elec. Co.
Therm—Thermoid
Timkn—Timken
Torbn—Torbensen
Tuth—Tuthill
Univl—Universal Prdts.
Unv—Universal
Unvsl—Universal Mach.
U. S.—U. S. Spring Co.
Wag—Wagner
Warn—Warner
Wau—Waukesha
West—Westinghouse
Wil-B—Wilcox Bennett
Wis—Wisconsin Parts
W-L—Ward-Leonard
W&L—Waterhouse & Lester Co.
Way—Wayne Wheel Co.
Wol—Wohlrab
Wsc—Wisconsin
Yng—Youngstown Pressed Steel Co.

Detailed Technical Specifications of

Name and Model	Tons Capacity	Chassis Price	Wheelbase, Inches	FRAME: Make	FRAME: Material	FRAME: Type	TIRES: Kind	TIRES: Size in Ins. Front	TIRES: Size in Ins. Rear	WHEELS: Make	WHEELS: Type	ENGINE: Make	ENGINE: No. Cyl. Bore and Stroke—N.A.C.C. Hp.	ENGINE: Cy'inders Cast	COOLING: Water Circ.	COOLING: Radiator CASE Make	COOLING: Radiator CASE Type	COOLING: Radiator CORE Make	COOLING: Radiator CORE Type	IGNITION: Type	IGNITION: Make	IGNITION: Spark Advance	ELEC. SYSTEM: Type	ELEC. SYSTEM: Make	ELEC. SYSTEM: Extra Cost $
Mack AB	2	$3,300	opt.	own...	p-stl..	flex..	sol....	36x4	36x4d	Sch...	wd....	own...	4-4 x5 -25.6	2	cent...	own...	sht.....	own...	cel.....	sing...	Spltf ..	hand..	lhtg-2*	L-N...	175*
Mack AB	2	3,300	opt.	own...	p-stl..	flex..	sol....	36x4	36x4d	Sch...	wd....	own...	4-4 x5 -25.6	2	cent...	own...	sht.....	own...	cel.....	sing...	Spltf..	hand..	lhtg-2*	L-N...	175*
Mack AC	3½	4,950	opt.	own...	p-stl..	flex..	sol....	36x5	40x5d	Sch...	wd....	own...	4-5 x6 -40.0	2	cent...	own...	cst.....	own...	pln.....	dual...	Spltf..	hand..	lhtg-2*	L-N...	175*
Mack Tractor AB	5	3.400	120	own...	p-stl..	flex..	sol....	36x4	36x4d	Sch...	wd....	own...	4-4 x5 -25.6	2	cent...	own...	sht.....	own...	cel.....	sing...	Spltf..	hand..	lhtg 2*	L-N...	175*
Mack AC	5½	5,500	opt.	own...	p-stl..	flex..	sol....	36x6	40x6d	Sch...	wd....	own...	4-5 x6 -40.0	2	cent...	own...	cst.....	own...	pln.....	dual..	Spltf..	hand..	lhtg-2*	L-N...	175*
Mack Tractor AC	7	4,950	119	own...	p-stl..	flex..	sol....	36x5	40x5d	Sch...	wd....	own...	4-5 x6 -40.0	2	cent...	own...	cst.....	own...	pln.....	dual...	Spltf..	hand..	lhtg-2*	L-N...	175*
Mack AC	7½	6,000	opt.	own...	p-stl..	flex..	sol....	36x7	40x7d	Sch...	wd....	own...	4-5 x6 -40.0	2	cent...	own...	cst.....	own...	pln.....	dual...	Spltf..	hand..	lhtg-2*	L-N...	175*
Mack Tractor AC	11	5,500	119	own...	p-stl..	flex..	sol....	36x6	40x6d	Sch...	wd....	own...	4-5 x6 -40.0	2	cent...	own...	cst.....	own...	cel.....	dual..	Spltf..	hand..	lhtg-2*	L-N...	175*
Mack Tractor AC	15	6,000	119	own...	p-stl..	flex..	sol....	36x7	40x7d	Sch...	wd....	own...	4-5 x6 -40.0	2	cent...	own...	cst.....	own...	pln.....	dual...	Spltf..	hand..	lhtg-2*	L-N...	175*
Master JW	1½	2,290	142	P&B..	p-stl..	s-flex..	sol....	34x3½	34x5	Prud..	wd....	Buda..	4-4½x5½-27.2	4	cent...	own...	cst.....	Chgo..	fin.....	sing...	Eismn.	fixed..	s&l*...	West..	150
Master JI	1½	2,190	142	P&B..	p-stl..	s-flex..	sol....	34x3½	34x5	Prud..	wd....	Buda..	4-4½x5½-27.2	4	cent...	own...	cst.....	Chgo..	fin.....	sing...	Eismn.	fixed..	s&l*...	West..	150
Master M	2	2,590	144	P&B..	p-stl..	s-flex..	sol....	34x4	36x7	Prud..	wd....	Buda..	4-4½x5½-29.0	4	cent...	own...	cst.....	Chgo..	fin.....	sing...	Eismn.	fixed..	s&l*...	West..	150
Master W	2	2,890	144	P&B..	p-stl..	s-flex..	sol....	34x4	36x7	Prud..	wd....	Buda..	4-4½x5½-29.0	4	cent...	own...	cst.....	Chgo..	fin.....	sing...	Eismn.	fixed..	s&l*...	West..	150
Master A	3½	3,990	158	P&B..	p-stl..	s-flex..	sol....	36x5	40x5d	Sth...	mt....	Buda..	4-4½x6½-32.4	4	cent...	own...	cst.....	Chgo..	fin.....	sing...	Eismn.	auto..	s&l*...	West..	150
Master B	5	4,990	170	P&B..	p-stl..	s-flex..	sol....	36x6	40x6d	Sth...	mt....	Buda..	4-5 x6 -36.2	4	cent...	own...	cst.....	Chgo..	fin.....	sing...	Eismn.	auto..	lghtg*.	West..	150*
Master Tractor T	6	2,850	110	P&B..	p-stl..	s-flex..	sol....	34x4	36x4d	Prud..	wd....	Buda..	4-4½x5½-29.0	4	cent...	own...	cst.....	Chgo..	fin.....	sing...	Eismn.	fixed..	lghtg*.	West..	150*
Maxwell 1½	1½	1,185	124	Prsh..	p-stl..	s-flex..	sol*...	32x3	32x4	Kel...	wd....	own...	4-3½x4½-21.1	4	ther...	own...	prs.....	own...	fin.....	sing...	A-Knt	hand..	lghtg..	Aut-L.	none
Moreland 19N	1	2,600	126	Smh..	p-stl..	rigid..	pnu...	35x5	35x5	Drt...	mt....	Buda..	4-3½x5½-22.5	4	cent...	own...	cst.....	Mod..	cel.....	sing...	Spltf..	hand..	lghtg..	West..	....
Moreland 19B	1½	2,930	126	Smh..	p-stl..	rigid..	sol....	36x3½	36x5	Sth...	mt....	Con...	4-4½x5½-27.2	4	cent...	own...	cst.....	Mod..	cel.....	sing...	Spltf..	hand..	lghtg..	West..	....
Moreland 19C	2½	3,775	144	Smh..	p-stl..	rigid..	sol....	36x4	36x7	Sth...	mt....	Con...	4-4½x5½-32.4	2	cent...	own...	cst.....	Mod..	cel.....	sing...	Spltf..	hand..	lghtg..	West..	....
Moreland 19G	4	4,875	162	Smh..	p-stl..	rigid..	sol....	36x5	40x5d	Sth...	mt....	Con...	4-4½x6 -36.2	2	cent...	own...	cst.....	Mod..	cel.....	sing...	Spltf..	hand..	lghtg..	West..	....
Moreland 19V	5	5,350	192	Smh..	p-stl..	rigid..	sol....	36x6	40x6d	Sth...	mt....	Con...	4-4½x6 -36.2	2	cent...	own...	cst.....	Mod..	cel.....	sing...	Spltf..	hand..	lghtg..	West..	....
Muskegon 20	2	2,325	144	P&B..	p-stl..	flex..	sol....	36x4	36x6	Prud..	wd....	Con...	4-4½x5½-27.2	2	cent...	own...	cst.....	M-R..	cel.....	sing...	Eismn.	fixed..	none..	none..	none
Mutual 2A	2	3,375	150	P&B..	p-stl..	s-flex..	sol*...	36x4	36x8	Sth*..	mt*..	Wsc...	4-4 x6 -25.6	4	cent...	Pfx..	cst.....	Pfx...	cel.....	sing...	Bosch.	hand..	s&l..	West..	none
Mutual 2½AP	2½	.....	153	P&B..	p-stl..	s-flex..	pnu...	38x7	42x9	Day*..	mt....	Wsc...	4-4 x6 -25.6	....	.....	Pfx..	.....	Pfx...	cel.....	sing...	Bosch.	hand..	s&l..	West..	none
Mutual 3½A	3½	.....	....	P&B..	p-stl..	s-flex..	sol....	36x5	40x10	Sth*..	mt....	Wsc...	4-4½x6 -32.4	4	.....	Pfx..	.....	Pfx...	cel.....	sing...	Bosch.	hand..	s&l..	West..	none
Mutual 5A	5	.....	....	P&B..	p-stl..	s-flex..	sol....	36x6	40x12	Sth*..	mt....	Wsc...	4-5 x6 -40.0	4	.....	Pfx..	.....	Pfx...	cel.....	sing...	Bosch.	hand..	s&l..	West..	none
Napoleon 9	1	1,385	132	own...	rol-c..	rigid..	sol*...	32x3½	34x4	Roy...	wd....	Gray..	4-3½x5 -19.6	4	ther...	Chgo..	cst.....	Chgo..	fin.....	sing...	Aut-L.	hand..	lghtg.	Aut-L.	none
Napoleon 11	1½	1,660	132	own...	rol-c..	rigid..	sol*...	32x4	34x5	Roy...	wd....	Gray..	4-3½x5 -19.6	4	ther...	Chgo..	cst.....	Chgo..	fin.....	sing...	Aut-L.	hand..	lghtg..	Aut-L.	none
Nash 2018	1	1,650	130	Smh..	p-stl..	rigid..	sol*...	34x3	34x4	own...	wd....	own...	4-3¾x5½-22.5	4	cent...	McC..	cst.....	McC..	fin.....	sing...	Eismn.	hand..	s&l-2..	Aut-L.	none
Nash 3018	1½	2,250	144	Smh..	p-stl..	rigid..	sol*...	34x4	36x6	own...	wd....	own...	4-3¾x5½-22.5	4	cent...	McC..	cst.....	McC..	fin.....	sing...	Eismn.	hand..	s&l-2..	Aut-L.	none
Nash 4017	2	3,250	124	Smh..	p-stl..	rigid..	sol*...	36x5	36x5	own...	mt....	Buda..	4-4½x5½-29.0	4	cent...	McC..	cst.....	McC..	fin.....	sing...	Eismn.	hand..	none..	none..	none
Nelson & LeMoon. F1½	1½	.....	opt.	own...	rol-c..	s-flex..	sol*...	36x3½	36x5	Prud..	wd....	Con...	4-4½x5½-27.2	4	cent...	own...	cst.....	Chgo..	fin.....	sing...	Bosch.	hand..	s&l-2*	West..	175
Nelson & LeMoon. F2	2	.....	opt.	own...	rol-c..	s-flex..	sol....	36x4	36x7	Prud..	wd....	Con...	4-4½x5½-27.2	4	cent...	own...	cst.....	Chgo..	fin.....	sing...	Bosch.	hand..	s&l-2*	West..	175
Nelson & LeMoon. F3½	3½	.....	opt.	own...	rol-c..	s-flex..	sol....	36x5	36x5d	Prud..	wd....	Con...	4-4½x5½-32.4	2	cent...	own...	cst.....	Chgo..	fin.....	sing...	Bosch.	hand..	s&l-2*	West..	175
Nelson & LeMoon. FC5	5	.....	opt.	own...	rol-c..	s-flex..	sol....	36x6	40x6d	Prud..	wd....	Con...	4-4½x6 -36.2	2	cent...	own...	cst.....	Chgo..	fin.....	dual..	Bosch.	hand..	s&l-2*	West..	175
Netco D	2	3,200	144	P&B..	p-stl..	flex..	sol*...	36x4	36x7	Arch..	wd....	Con...	4-4½x5½-27.2	4	cent...	own...	cst.....	R-T...	fin.....	sing...	Eismn.	fixed..	none..	none..	none
Netco H	2½	3,400	168	P&B..	p-stl..	s-flex..	sol*...	36x4	36x8	Arch..	wd....	Con...	4-4½x5½-32.4	2	cent...	own...	cst.....	R-T...	fin.....	sing...	Eismn.	fixed..	none..	none..	none
Niles E	2	2,800	140	Savg..	p-stl..	flex..	sol....	36x4	36x7	H&D.	wd....	Con...	4-4½x5½-27.2	4	cent...	Fed...	sht.....	Fed...	cel.....	sing...	Eismn.	hand..	none..	none..	none
Noble A20	1	.....	144	P&B..	p-stl..	s-flex..	sol*...	36x3½	36x4	Bim...	wd....	Buda..	4-3½x5½-22.5	4	cent...	Chgo..	cst.....	Chgo..	fin.....	sing...	Eismn.	hand..	s&l-2..	Eismn.	....
Noble B30	1½	.....	144	P&B..	p-stl..	s-flex..	sol*...	36x3½	36x5	Bim...	wd....	Buda..	4-3½x5½-22.5	4	cent...	Chgo..	cst.....	Chgo..	fin.....	sing...	Eismn.	hand..	s&l-2..	Eismn.	....
Noble C40	2	.....	148	P&B..	p-stl..	s-flex..	sol*...	36x4	36x7	Bim...	wd....	Buda..	4-4 x5½-25.6	4	cent...	Chgo..	cst.....	Chgo..	fin.....	sing...	Eismn.	hand..	s&l-2..	Eismn.	....
Noble D50	2½	.....	162	P&B..	p-stl..	s-flex..	sol*...	36x4	36x8	Bim...	wd....	Buda..	4-4½x5½-29.0	4	cent...	Chgo..	cst.....	Chgo..	fin.....	sing...	Eismn.	hand..	lghtg..	Eismn.	....
Noble E70	3½	.....	182	P&B..	p-stl..	s-flex..	sol....	36x5	36x10	Bim...	wd....	Buda..	4-4½x6 -32.4	4	cent...	Chgo..	cst.....	Chgo..	fin.....	sing...	Eismn.	hand..	lghtg..	Eismn.	....
Northway B-2	2	3,250	146	Drt...	p-stl..	s-flex..	sol....	36x4	36x4d	Clrk..	mt....	own...	4-4 x6 -25.6	4	cent...	G&O..	cst.....	G&O..	cel.....	sing...	Wag..	hand..	s&i-2.	West..	none
Northway B-3½	3½	4,250	160	Drt...	p-stl..	s-flex..	sol....	36x5	40x5d	Clrk..	mt....	own...	4-4 x6 -25.6	4	cent...	G&O..	cst.....	G&O..	cel.....	sing...	Wag..	hand..	s&i-2.	West..	none
Old Hickory W	1	2,175	135	own...	rol-c..	s-flex..	sol*...	36x3½	36x4	Stn...	wd....	Con...	4-3¾x5 -22.5	4	ther...	own...	cst.....	Lng...	fin.....	sing...	Eismn.	hand..	none..	none..	none
Old Reliable A	1½	2,350	138	Savg..	p-stl..	flex..	sol....	34x4	36x6	Prud..	wd....	Wsc...	4-4 x5 -25.6	4	cent...	Chgo..	sht.....	Chgo..	fin.....	sing...	Bosch.	hand..	lghtg..	Vesta.	50*
Old Reliable B	2½	3,250	160	own...	rol-c..	rigid..	sol....	34x4	36x4d	Crn...	wd....	Wsc...	4-4½x6 -29.0	4	cent...	Chgo..	cst.....	Chgo..	fin.....	sing...	Bosch.	hand..	lghtg..	Vesta.	50*
Old Reliable C	3½	4,000	160	own...	rol-c..	rigid..	sol....	36x5	36x5d	Crn...	wd....	Wsc...	4-4½x6 -29.0	4	cent...	Chgo..	cst.....	Chgo..	fin.....	sing...	Bosch.	hand..	lghtg..	Vesta.	50*
Old Reliable D	5	5,000	166	own...	rol-c..	rigid..	sol....	36x6	40x6d	Crn...	wd....	Wsc...	4-5 ½x5½-41.6	2	cent...	Chgo..	cst.....	Chgo..	fin.....	sing...	Bosch.	hand..	lghtg..	Vesta.	50*
Old Reliable K	7½	6,000	136	own...	rol-c..	rigid..	sol....	36x6	40x7d	Crn*..	wd*..	Wau..	4-4½x6½-36.2	2	cent...	Chgo..	cst.....	Chgo..	fin.....	sing...	Bosch.	hand..	none..	none..	none
Packard 1½-E	1½	3,200	144	own...	rol-c..	s-flex..	sol....	34x3½	34x3½d	own...	wd....	own...	4-4 x5½-25.6	4	cent...	Fed...	cst.....	Fed...	fin.....	dual..	Spltf..	hand..	s&l-2..	Bijur..	230
Packard 2-E	2	3,600	144	own...	rol-c..	s-flex..	sol....	34x4	34x4d	own...	wd....	own...	4-4 x5½-25.6	4	cent...	Fed...	cst.....	Fed...	fin.....	dual..	Spltf..	hand..	s&l-2..	Bijur..	230
Packard 3-E	3	4,350	156	own...	rol-c..	s-flex..	sol....	36x5	36x5d	own...	wd....	own...	4-4½x5½-32.4	4	cent...	Fed...	cst.....	Fed...	fin.....	dual..	Spltf..	hand..	s&l-2..	Bijur..	230

ABBREVIATIONS—Types of Construction

*—other options
amid—amidship
auto—automatic
bevl—bevel
cel—cellular
cent—centrifugal
chn—chain
cst—cast
ctr—center
cylinders cast, 2 in pairs
cylinders cast, 4 in block
cylinders cast, 3 in threes
cylinders cast, 1 singly
cyl-ends—cylinder-ends
d—dual
d-d—dry-disk
d-p—dry-plate
dplx—from both motor & driveshaft
d-rd—double reduction
d-s—drive-shaft
elec—electric
ext-d-s—external drive-shaft
ext-f-w—external front wheel
ext-g—external gear
ext-jst—external jack-shaft
ext-r-w—external rear wheel
fab—fabric
fin—finned tube
flex—flexible
fric—friction
g-p—gear pump
grv—gravity
gset—from gearset
hyd—hydraulic
ind-c—individual clutch
int-g—internal gear
int-g-d—internal gear driv) on 4 wheels
int-r-w—internal rear wheel
jst—unit with jackshaft
l—left
l-b—loose ball
lghtg—lighting only
motr—unit with motor
mt—metal (wheels)
mtl—metal (universal joint)
opt—optional
pist—piston pump
plan—planetary
pln—plain tube
pnu—pneumatic
pres—pressure
prog—progressive
prs—pressed steel
p&s—pneumatics in front, solids in rear
p-stl—pressed steel
r—right
r&c—right & center
r-rd—radius rods
rol-c—rolled channel
rol-i—rolled I-beam
selec—selective
s-flex—semi-flexible
sht—sheet
s&l—starting & lighting
sl&i-2—starting, lighting & ignition, 2 unit
sol—solid
sprgs—springs
sq-t—square-tube
start—starting only
t-arm—torque arm
ther—thermo-syphon
t-p—two-point
t-t—torsion tube
vac—vacuum
wat-tube—water tube
wd—wood
w-d—multiple disk in oil
w-p—plate in oil
wr—wire
zz-t—zig-zag tube

ABBREVIATIONS—Makers of Parts

*Other Options
Acme—Acme Universal Joint Mfg. Co.
A-Knt—Atwater-Kent
Al-Ch—Allis-Chalmers
Aloy—Alloy Steel Spring
Amer—American Magneto Co.
Arch—Archibald
Arvac—Arvac Co.
Aut-L—Auto-Lite
Auto—Auto-Wheel Co.
A-W-W—Automotive Wire Wheel Co.
B&B—Ball & Ball
B-Beck—Borg & Beck
Berlg—Berling
Bet—Betts Spring Co.
Bim—Bimel
B-Lipe—Brown-Lipe
Blood—Blood Bros.
Brem—Bremer
Bvr—Beaver Mfg. Co.
B&W—B & W Mfg. Co.
Can—Candler Radiator
Cant—Canton-Cleveland
Carl—Carleton Co.
Cart—Carter Carburetor
Cas—G. M. Castle
CAS—C. A. S. Products
Chgo—Chicago Mfg. Co.
Chic—Chicago-Standard
Chmp—Champion Auto Spring Co.
Chy—Cheney
Clrk—Clark Equipment
Col—Columbia Axle Co.
Con—Continental Motor
Conn—Connecticut
Crn—Crane & Mac-Mahon Co.
C-S—Christopher Simpson Iron Co.
Day—Dayton
Del—Delaney
Detlaf—Detlaff

Gasoline Motor Trucks for 1920—Cont.

ENGINE								TRANSMISSION										BRAKES		CONTROL			UNIVERSALS		Name an* Model
GOVERNOR			SPEED		FUEL SYS.		CLUTCH	GEARSET				FINAL DRIVE								STEERING GEAR					
Type	Make	Drive	Motor in r.p.m.	Truck in m.p.h.	Carbureter Make	Fuel Feed	Type	Make	Type	Make	Placed	Speeds	Type	Rear Axle Make	Total Gear Reduction	Propulsion Taken By	Torque Taken By	Springs Make	Foot	Hand	Placed	Make	Levers	Type	Make	
cent.	own...	motor	1250	19	Zenith.	grv..	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	4	chn...	own....	6.99	r-rd...	.....	Merl..	ext-d-s..	int-r-w	l....	own...	ctr..	mtl..	Blood..	Mack.....AB
cent.	own...	motor	1250	16	Zenith.	grv..	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	4	worm.	Timkn.	8.50	sprgs..	sprgs..	Merl..	int-r-w..	int-r-w	l....	own...	ctr..	mtl..	Spicer..	Mack.....AB
cent.	own...	motor	1000	14	Zenith.	grv..	d-p...	own....	selec...	own....	jst....	3	chn...	own....	8.49	r-rd...	.....	Merl..	ext-jst..	int-r-w	l....	own...	ctr..	mtl..	Spicer..	Mack.....AC
cent.	own...	motor	1250	13	Zenith.	grv..	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	4	chn...	own....	10.53	r-rd...	.....	Merl..	ext-d-s..	int-r-w	l....	own...	ctr..	mtl..	Blood..	Mack.....Tractor AB
cent.	own...	motor	1000	13	Zenith.	grv..	d-p...	own....	selec...	own....	jst....	3	chn...	own....	9.00	r-rd...	.....	Merl..	ext-jst..	int-r-w	l....	own...	ctr..	mtl..	Spicer..	Mack.....AC
cent.	own...	motor	1000	11	Zenith.	grv..	d-p...	own....	selec...	own....	jst....	3	chn...	own....	10.76	r-rd...	.....	Merl..	ext-jst..	int-r-w	l....	own...	ctr..	mtl..	Spicer..	Mack.....Tractor AC
cent.	own...	motor	1000	10	Zenith.	grv..	d-p...	own....	selec...	own....	jst....	3	chn...	own....	11.58	r-rd...	.....	Merl..	ext-jst..	int-r-w	l....	own...	ctr..	mtl..	Spicer..	Mack.....AC
cent.	own...	motor	1000	10	Zenith.	grv....	d-p...	own....	selec...	own....	jst....	3	chn...	own....	11.58	r-rd...	.....	Merl..	ext-jst..	int-r-w	l....	own...	ctr..	mtl..	Spicer..	Mack.....Tractor AC
cent.	own...	motor	1000	8	Zenith.	grv..	d-p...	own....	selec...	own. .	jst....	3	chn...	own....	14.10	r-rd...	.....	Merl..	ext-jst..	int-r-w	l....	own...	ctr..	mtl..	Spicer..	Mack.....Tractor AC
suct..	McCn..	motor	1200	15	Mast...	grv..	d-d...	Fuller..	selec...	Fuller..	motr..	3	worm.	Timkn.	7.75	sprgs..	sprgs..	Detr..	ext-r-w..	int-r-w	l....	Ross..	ctr..	mtl..	Arvac..	Master.....JW
suct..	McCn..	motor	1200	15	Mast...	grv..	d-d...	Fuller..	selec...	Fuller..	motr..	3	int-g..	Torbn..	8.00	sprgs..	sprgs..	Detr..	ext-r-w..	int-r-w	l....	Ross..	ctr..	mtl..	Arvac..	Master.....JI
suct..	McCn..	motor	1200	16	Mast...	grv*.	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	4	int-g..	Timkn.	8.00	sprgs..	sprgs..	Detr..	ext-r-w..	int-r-w	l....	Ross..	ctr..	mtl..	Arvac..	Master.....M
suct..	McCn..	motor	1200	15	Mast...	grv*.	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	4	worm.	Timkn.	8.50	sprgs..	sprgs..	Detr..	ext-r-w..	int-r-w	l....	Ross..	ctr..	mtl..	Arvac..	Master.....W
cent.	Pierce..	motor	1100	12	Mast...	grv*.	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	10.33	sprgs..	sprgs..	Detr..	int-r-w..	int-r-w	l....	Ross..	ctr..	mtl..	Spicer*	Master.....A
cent.	Pierce..	motor	1000	10	Mast...	grv*.	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	10.25	sprgs..	sprgs..	Detr..	int-r-w..	int-r-w	l....	Ross..	ctr..	mtl..	Spicer..	Master.....B
suct..	McCn..	motor	1200	15	Mast...	grv*.	d-d...	B-Lipe*	selec...	B-Lipe*	motr..	4	int-g..	Torbn..	8.00	sprgs..	sprgs..	Detr..	int-r-w..	int-r-w	l....	Ross..	ctr..	mtl..	Arvac..	Master Tractor.....T
none.	none.	.....	1562	22	John...	grv...	cone..	own....	selec...	own....	motr..	3	worm.	own....	7.25	sprgs..	sprgs..	Detr..	int-r-w..	int-r-w	l....	own...	ctr..	mtl..	own..	Maxwell.....1½
none.	none..	none..	1150	20	Miller..	grv...	d-d...	own....	selec...	own....	amid..	4	worm.	Timkn.	6.20	r-rd...	sprgs..	U.S..	int-r-w..	int-r-w	l....	Gem..	ctr..	fab..	own.....	Moreland.....19N
none.	none..	none..	1150	18	Miller..	grv...	d-d...	own....	selec...	own....	amid..	4	worm.	Timkn.	7.09	r-rd...	sprgs..	U.S..	int-r-w..	int-r-w	l....	Ross..	ctr..	fab..	own...	Moreland.....19B
none.	none..	none..	1100	17	Miller..	grv...	d-d...	own....	selec...	own....	amid..	4	worm.	Timkn.	6.80	r-rd...	sprgs..	U.S..	int-r-w..	int-r-w	l....	Ross..	ctr..	fab..	own...	Moreland.....19C
cent.	Con....	motor	1050	16	Miller..	grv...	d-d...	own....	selec...	own....	amid..	4	worm.	Timkn.	7.80	r-rd...	sprgs..	U.S..	int-r-w..	int-r-w	l....	Ross..	ctr..	fab..	own...	Moreland.....19G
cent.	Con....	motor	1050	13	Miller..	grv...	d-d...	own....	selec...	own....	amid..	4	worm.	Timkn.	10.25	r-rd...	sprgs..	.....	int-r-w..	int-r-w	l....	Ross..	ctr..	fab..	own...	Moreland.....19V
cent.	Pierce..	gset...	1260	15	Detrt..	vac...	d-d...	Fuller..	selec...	Fuller..	motr..	3	int-g..	Torbn..	1.00	sprgs..	sprgs..	Cant..	ext-r-w..	int-r-w	l....	Lavn..	ctr..	mtl..	Arvac*	Muskegon.....20
cent.	Dplx...	Dplx..	1000	14	Stmbg.	grv...	w-d...	H-S*..	selec...	Fuller..	amid..	4	worm.	Shel....	1.00	r-rd...	sprgs..	Mth..	int-r-w..	int-r-w	l....	Ross..	ctr..	mtl..	Spicer..	Mutual.....2A
cent.	Dplx...	Dplx..	1200	20	Stmbg.	grv...	w-d...	H-S..	.....	.....	amid..	4	worm.	Shel....	.....	r-rd...	r-rd...	Mth..	int-r-w..	int-r-w	l....	Ross..	ctr..	mtl..	Spicer..	Mutual.....2½AP
cent.	Dplx...	Dplx..	.....	.....	Stmbg.	grv...	w-d...	H-S..	.....	.....	amid..	4	worm.	Shel....	.....	r-rd...	r-rd...	Mth..	int-r-w..	int-r-w	l....	Ross..	ctr..	mtl..	Spicer..	Mutual.....3½A
cent.	Dplx...	Dplx..	.....	.....	Stmbg.	grv...	.....	H-S..	.....	.....	amid..	4	worm.	Shel....	.....	r-rd...	r-rd...	Mth..	int-r-w..	int-r-w	l....	Ross..	ctr..	mtl..	Spicer..	Mutual.....5A
cent.	Pierce..	motor	1400	12	Stmbg.	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	int-g..	Clrk...	6.00	sprgs..	sprgs..	Mth..	ext-r-w..	ext-d-s	l....	Lavn..	ctr..	mtl..	Unvsl..	Napoleon.....9
cent.	Pierce..	motor	1400	12	Stmbg.	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	int-g..	Clrk...	8.00	sprgs..	sprgs..	Mth..	ext-r-w..	ext-d-s	l....	Lavn..	ctr..	mtl..	Unvsl..	Napoleon.....11
cent.	Simp...	motor	1351	20	Stmbg.	grv...	d-p...	B-Beck.	selec...	Detrt..	motr..	3	int-g..	Clrk...	6.83	sprgs..	sprgs..	Aloy..	ext-r-w..	ext-d-s	l....	Jacox.	ctr..	mtl..	own...	Nash.....2018
cent.	Simp...	motor	1400	15	Stmbg.	grv...	d-p...	B-Beck.	selec...	Detrt..	amid..	4	int-g..	Clrk...	8.00	sprgs..	sprgs..	Mth..	ext-r-w..	ext-d-s	l....	Jacox.	ctr..	mtl..	own...	Nash.....3018
cent.	Simp...	motor	1270	16	Stmbg.	grv...	d-p...	B-Beck.	selec...	own....	amid..	4	int-g-4	own....	8.05	sprgs..	sprgs..	Mth..	ext-r-w..	ext-d-s	l....	Lavn..	ctr..	mtl..	own...	Nash.....4017
cent.	Pierce..	motor	1200	16	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	3	worm.	Timkn.	6.75	sprgs..	sprgs..	Tuth..	int-r-w..	int-r-w	r....	Lavn..	ctr..	fab..	own...	Nelson & LeMoon..F1½
cent.	Pierce..	motor	1200	16	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	3	worm.	Timkn.	7.00	sprgs..	sprgs..	Tuth..	int-r-w..	int-r-w	r....	Lavn..	ctr..	fab..	own...	Nelson & LeMoon....F2
cent.	Pierce..	motor	1100	12	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	4	worm.	Timkn.	8.75	sprgs..	sprgs..	Tuth..	int-r-w..	int-r-w	r....	Lavn..	ctr..	fab..	own...	Nelson & LeMoon..F3½
cent.	Pierce..	motor	1100	10	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	10.33	sprgs..	sprgs..	Tuth..	int-r-w..	int-r-w	r....	Lavn..	ctr..	fab..	own...	Nelson & LeMoon..FC5
none.	none..	none..	1500	24	Zenith.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	3	worm.	Timkn.	1.00	sprgs..	sprgs..	S-P..	int-r-w..	int-r-w	l....	Ross..	ctr..	mtl..	Hart..	Netco.....D
none.	none..	none..	1500	24	Zenith.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	1.00	sprgs..	sprgs..	S-P..	int-r-w..	int-r-w	l....	Ross..	ctr..	mtl..	Hart..	Netco.....H
cent.	Pierce..	motor	2500	25	Stmbg.	grv...	d-d...	B-Beck.	selec...	Covert.	amid..	3	worm.	Timkn.	8.50	r-rd...	sprgs..	Iron..	int-r-w..	int-r-w	l....	Gem..	ctr..	mtl..	Blood..	Niles.....E
cent.	Pierce..	motor	1468	20	Stmbg.	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	worm.	Shel....	7.80	sprgs..	sprgs..	Tuth..	int-r-w..	int-r-w	l....	Lavn..	ctr..	mtl..	M&E..	Noble.....A20
cent	Pierce..	motor	1290	18	Stmbg.	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	worm.	Shel....	7.75	sprgs..	sprgs..	Tuth..	int-r-w..	int-r-w	l....	Lavn..	ctr..	mtl..	M&E..	Noble.....B30
cent.	Pierce..	motor	1075	15	Stmbg.	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	worm.	Shel....	7.75	sprgs..	sprgs..	Tuth..	int-r-w..	int-r-w	l....	Lavn..	ctr..	mtl..	M&E..	Noble.....C40
cent.	Pierce..	motor	1215	15	Stmbg*	grv...	d-d...	Fuller..	selec...	Fuller..	amid..	4	worm.	Shel....	7.75	sprgs..	sprgs..	Tuth..	int-r-w..	int-r-w	l....	Lavn..	ctr..	mtl..	M&E..	Noble.....D50
cent.	Pierce..	motor	972	12	Stmbg*	grv*.	d-d...	Fuller..	selec...	Fuller..	amid..	4	worm.	Shel....	8.75	sprgs..	sprgs..	Tuth..	int-r-w..	int-r-w	l....	Lavn..	ctr..	mtl..	M&E..	Noble.....E70
cent.	Pierce..	motor	1300	18	Schblr..	vac...	d-d...	Fuller..	selec...	Fuller..	motr..	4	worm.	Shel...	7.75	sprgs..	sprgs..	S-P..	int-r-w..	int-r-w	l....	Ross..	ctr..	mtl..	Spicer..	Northway.....B-2
cent.	Pierce..	motor	1350	14	Schblr..	vac...	d-d...	Fuller..	selec...	Fuller..	motr..	4	worm.	Shel...	10.25	sprgs..	sprgs..	S-P..	int-r-w..	int-r-w	l....	Ross..	ctr..	mtl..	Spicer..	Northway.....B-3½
cent.	Pierce..	motor	1200	18	Stmbg.	vac...	d-p...	B-Beck.	selec...	G-Lees.	motr..	3	worm.	Timkn.	1.00	sprgs..	sprgs..	S-P..	int-r-w..	int-r-w	l....	Lavn..	ctr..	mtl..	Blood..	Old Hickory.....W
none.	none..	none..	1135	15	Stmbg.	vac...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	3	worm.	Shel...	7.75	sprgs..	sprgs..	Shel...	int-r-w..	int-r-w	r....	Ross..	ctr..	mtl..	Spicer..	Old Reliable.....A
suct..	Mnrch.	motor	1135	15	Stmbg.	vac...	d-d...	Fuller..	selec...	Fuller..	amid..	4	worm.	Shel...	7.75	sprgs..	sprgs..	Shel...	int-r-w..	int-r-w	r....	Ross..	ctr..	mtl..	Spicer..	Old Reliable.....B
suct..	Mnrch.	motor	1280	15	Stmbg.	vac...	d-d...	Fuller..	selec...	Fuller..	amid..	4	worm.	Shel...	8.75	sprgs..	sprgs..	Shel...	int-r-w..	int-r-w	r....	Ross..	ctr..	mtl..	Spicer..	Old Reliable.....C
suct..	Mnrch.	motor	1155	15	Stmbg.	vac...	w-d...	Unv....	selec...	Savg...	amid..	4	worm.	Shel...	8.75	sprgs..	sprgs..	Shel...	int-r-w..	int-r-w	r....	Ross..	r....	mtl..	Spicer..	Old Reliable.....D
cent.	Wau...	motor	955	10	Stmbg.	grv....	w-d...	Unv....	selec...	Savg...	jst....	4	chn...	Shel...	10.86	r-rd...	.....	Shel...	ext-d-s..	int-r-w	r....	Ross..	r....	mtl..	Hart...	Old Reliable.....K
cent.	own....	motor	1000	16	own....	pres..	d-d...	own....	selec...	own....	amid.	4	worm.	own....	6.25	r-rd...	t-arm.	Sp-P..	ext-d-s..	int-r-w	l....	own...	l&c.	mtl*	Spicer*	Packard.....1½-E
cent.	own....	motor	1000	14	own....	pres..	d-d...	own....	selec...	own....	amid.	4	worm.	own....	7.25	r-rd...	t-arm.	Sp-P..	ext-d-s..	int-r-w	l....	own...	l&c.	mtl*.	Spicer*	Packard.....2-E
cent.	own....	motor	1000	12	own....	pres..	d-d...	own....	selec...	own....	amid..	4	worm.	own....	9.00	r-rd...	t-arm.	Sp-P..	ext-d-s..	int-r-w	l....	own...	l&c.	mtl*.	Spicer*	Packard.....3-E

ABBREVIATIONS—Makers of Parts—(Continued)—

Detrt—Detroit G. & M.
Ditw—Ditwiler Mfg. Co.
Dneto—Dyneto
Drt—Detroit Pressed Steel Co.
Dtr—Detroit Products
Dtrt—Detroit Lubricator
Dun—Dunbar Mfg. Co.
Dur—Durston Gear Corp.
E&M—English & Mersick
E&O—Eberly & Orris
Eismn—Eisemann
Ens—Ensign Carburetor
Eric—Ericsson Mfg. Co.
Eurk—Eureka
F&H—French & Hecht
FAC—F. A. Chapper
Fed—Fedders
Flx—Flexo Mfg. Co.
Frank—Francke Co.
G&D—Gray & Davis
G&O—G & O Mfg. Co.
G&S—Garden City Springs
Gem—Gemmer
G-Lees—Grant-Lees
Grn—Greens Car Wheel
H&D—Hoopes Bros. & Darlington
Har—Harrison
Hart—Hartford
Harv—Harvey
Hay—Hayes Wheel Co.
Her—Hercules
Hig—Higgins
Hink—Hinkley
Hol—Holley
H-Shaw—Hele-Shaw
H-S—Herschell-Spillman
Hyd—Hydraulic
Idl—Ideal
Ind—Indestructible
Iron—Iron City
Jacox—Jackson-Church-Wilcox
Jck—Jackson Auto
Jns—Phineas Jones & Co.
John—Johnson Co.
Kal—Kalamazoo
Kel—Kelsey Wheel Co.
Ken—Kenosha Wheel & Kuntz
Knz—Kuntz
Lavn—Lavine
LeR—Le Roi
Lght—Light Mfg. Co.
L-N—Leece-Neville Co.
Lng—Long
Lvgn—Livingston
Lyc—Lycoming
Marvl—Marvel
Mas—F. C. Mason & Co.
Mast—Master
McCn—McCanna
M&E—Merchant & Evans
McC—McCord
Mech—Mechanics Mach. Co.
Merl—Merrill Spring Co.
Miller—H. A. Miller
Mnrch—Monarch
Mod—Modine Mfg. Co.
Mot—Mott Wheel Wks.
M-R—Marlin-Rockwell
MSC—Massillon
Mth—Mather
Mut—Mutual Wheel Co.
Nat—National Spring
Natl—National Can Co.
N-E—North East
Nich—Nichols Elec. Co.
P&B—Parish & Bingham
Perk—Perkins
Pet—Peters Mach. Co.
Pfx—Perfex Radiator
Phil—Philadelphia
Phro—Pharo Mfg. Co.
Prsh—Parish Mfg. Co.
Prud—Prudden
Rayfld—Rayfield
Rem—Remy
Rowl—Wm. H. Rowland
Roy—Royer Wheel Co.
R-T—Rome-Turney
Rugl—Ruggles
Rus—Russel Car & Frdy.
Russl—Russel Axle Co.
Rut—Rutenber
R&V—Root & VanDervoort
Sag—Saginaw
Sal—Salisbury
Savg—Savage Arms
Sch—Schwarz Wheel Co.
Schblr—Schebler
Shel—Sheldon
Simp—Simplex
S-J—Shotwell-Johnson
S-M—Standard Malleable
Smh—A. O. Smith
Sth—Smith Steel Wheel
S-P—Standard Parts Co.
Spltf—Splitdorf
Sp-P—Spring Perch Co.
Stan—Standard Radiator
Stand—Standard Steel Spring Co.
Sterl—Sterling Bearings
Stmbg—Stromberg
Stn—Standard Wheel Co.
S-W—Sparks-Withington
Sum—Sumter Elec. Co.
Therm—Thermoid
Timkn—Timken
Torbn—Torbensen
Tuth—Tuthill
Univl—Universal Prdts
Unv—Universal
Unvsl—Universal Mach
U. S.—U. S. Spring Co.
Wag—Wagner
Warn—Warner
Wau—Waukesha
West—Westinghouse
Wil-B—Wilcox Bennett
Wis—Wisconsin Parts
W-L—Ward-Leonard
W&L—Waterhouse & Lester Co.
Way—Wayne Wheel Co.
Wol—Wohlrab
Wsc—Wisconsin
Yng—Youngstown Pressed Steel Co.

Detailed Technical Specifications of

Name and Model	Tons Capacity	Chassis Price	Wheelbase, Inches	FRAME			TIRES			WHEELS		ENGINE				COOLING					IGNITION			ELEC. SYSTEM		
								Size in Ins.									Radiator									
																	CASE		CORE							
				Make	Material	Type	Kind	Front	Rear	Make	Type	Make	No. Cyl. Bore and Stroke—N.A.C.C. Hp.	Cylinders Cast	Water Circ.	Make	Type	Make	Type	Type	Make	Spark Advance	Type	Make	Extra Cost $
Packard	4-E	4	$4,550	156	own...	rol-c..	s-flex..	sol....	36x5	40x5d	own...	wd....	own...	4-4½x5½-32.4	4	cent...	Fed...	cst.....	Fed...	fin	dual..	Spltf	hand..	s&l-2..	Bijur.	230
Packard	5-E	5	5,450	156	own..	rol-c..	s-flex..	sol ...	36x6	40x6d	own...	wd....	own...	4-5 x5½-40.0	4	cent...	Fed...	cst.....	Fed...	fin.....	dual..	Spltf..	hand..	s&l-2..	Bijur..	230
Packard	6-E	6	5,700	156	own...	rol-c..	s-flex..	sol....	36x6	40x7d	own...	wd....	own...	4-5 x5½-40.0	4	cent...	Fed...	cst.....	Fed...	fin.....	dual..	Spltf..	hand..	s&l-2..	Bijur..	230
Paige	5 -18	2½	3,150	150	own...	p-stl..	s-flex..	sol*...	36x4	36x4d	Day...	mt....	Con...	4-4½x5½-27.2	4	cent...	Natl..	cst.....	Natl..	fin.....	sing..	Bosch.	fixed..	none..	none..	none
Paige	51-18	3½	4,150	160	own...	p-stl..	s-flex..	sol*...	36x5	36x5d*	Day...	mt....	Con...	4-4½x5½-32.4	4	cent...	Natl..	cst.....	Natl..	fin.....	sing..	Bosch.	hand..	none..	none..	none
Parker	F9W	2	3,500	150	Smh..	p-stl..	s-flex..	sol....	34x4	36x4d	Bim...	wd....	Con...	6-3½x5½-29.5	4	cent...	own...	cst.....	Brem.	zz-t....	sing..	Bosch.	hand..	s&l-2..	West..	none
Parker	J9	3½	4,100	160	Smh..	p-stl..	s-flex..	sol....	36x5	40x5d	Bim...	wd....	Wsc...	4-4½x6 -324.	4	cent...	own...	cst.....	Brem.	zz-t....	sing..	Bosch.	hand..	s&l-2..	West..	none
Parker	M9	5	5,500	160	Smh..	p-stl..	s-flex..	sol....	36x6	40x6d	Sth....	mt.....	Con...	4-4½x6 -36.2	2	cent ..	own...	cst.....	Brem.	zz-t....	sing..	Bosch.	hand..	s&l-2..	West..	none
Pierce-Arrow	X4	2	4,300	150	Prsh..	p-stl..	flex..	sol*...	36x4	36x4d	own...	wd....	own...	4-4 x5½-25.6	2	cent...	own...	cst.....	own...	fin.....	dual..	Spltf..	hand..	sl&i-2.	West..	300
Pierce-Arrow	R9	5	5,500	168	Prsh..	p-stl..	flex..	sol....	36x5	40x6d	own...	wd....	own...	4-4½x6 -38.2	2	cent...	own...	cst.....	own...	fin.....	sing..	Spltf..	hand..	sl&i-2.	West..	300
Pioneer All Steel	F	2	2,790	144	Prsh..	p-stl..	.....	sol....	36x4	36x7	Budd.	mt....	Con...	4-4½x5½-27.2	4	cent...	McC..	cst.....	McC..	fin.....	dual..	Eismn.	auto..	none..	none..	none
Pony		½	320	90	own...	rol-c..	rigid..	pnu....	28x3	28x3	Prud.	wd....	own...	4-2½x4 -12.1	4	ther...	own...	prs.....	own...	cel.....	sing..	A-Knt	auto..	opt....	opt....	....
Power	B	2	2,950	150	own...	rol-c..	s-flex..	sol....	36x4	36x4d	Hay...	wd....	Con...	4-4½x5½-27.2	4	cent...	Can...	cst.....	Can...	cel.....	sing..	Simms	hand..	none..	none..	none
Rainier	R-11	¾	1,750	125	Prsh..	p-stl..	s-flex..	pnu....	34x4½	34x4½	Sch...	wd....	Con...	4-3½x5 -19.6	4	ther...	Har...	sht.....	Har...	cel.....	sing..	Bosch*	fixed..	opt...	Bosch*	125*
Rainier	R-9	1	1,875	125	Prsh..	p-stl..	s-flex..	sol....	32x3	32x4	Sch...	wd....	Con...	4-3½x5 -19.6	4	ther...	Har...	prs.....	Har...	cel.....	sing..	Simms	fixed..	opt...	Bosch*	125*
Rainier	R-6	1½	1,975	133	Prsh..	p-stl..	s-flex..	sol....	34x3	34x4	Sch...	wd....	Con...	4-3½x5 -19.6	4	ther...	Har...	prs.....	Har...	cel.....	sing..	Bosch*	fixed..	opt...	Bosch*	125*
Rainier	R-8	2	2,400	147	Prsh..	p-stl..	s-flex..	sol....	34x5	34x6	Sch...	wd....	Con...	4-3½x5 -22.5	4	ther...	Har...	prs.....	Har...	cel	sing..	Simms	fixed..	none..	none..	none
Reo	F	¾	1,285	128	own...	p-stl..	rigid..	pnu....	34x4½	34x4½	Prud*.	wd....	own...	4-4½x4½-27.2	2	cent...	own...	prs.....	own...	fin.....	sing..	em..	hand..	sl&i-2.	Rem..	none
Republic	10	1	1,595	124	Drt*..	p-stl..	s-flex..	sol*...	34x3	34x4	Prud*.	wd....	Con...	4-3½x5 -22.5	4	ther...	own...	cst.....	G&O..	cel.....	sing..	Eismn.	fixed..	s&l-2..	Aut-L.	....
Republic	11	1½	1,885	144	Drt*..	p-stl..	s-flex..	sol*...	34x3½	34x5	Prud*.	wd....	Con...	4-3½x5 -22.5	4	ther...	own...	cst.....	G&O..	cel.....	sing..	Eismn.	fixed..	s&l-2..	Aut-L.	....
Republic	19	2½	2,395	144	Drt*..	p-stl..	s-flex..	sol*...	36x4	36x7	Prud*.	wd....	Con...	4-4½x5½-27.2	4	cent...	own...	cst.....	G&O..	cel.....	sing..	Eismn.	hand..	s&l-2..	Aut-L.	....
Republic	20	3½	3,595	165	Drt*..	p-stl..	s-flex..	sol*...	36x5	36x10	Sth...	mt....	Con...	4-4½x5½-32.4	2	cent ..	own...	cst.....	G&O..	fin.....	sing..	Eismn.	hand..	lghtg..	.....	.....
Riker	B	3	4,600	150	Prsh..	p-stl..	rigid..	sol....	36x5	36x5d	Jns...	wd....	own...	4-4½x6 -29.0	2	cent...	own...	cst.....	G&O*	fin.....	sing..	Berlg..	hand..	s&l-2..	West .	225
Riker	BB	4	4,700	150	Prsh..	p-stl..	rigid..	sol....	36x5	36x6d	Jns...	wd....	own...	4-4½x6 -29.0	2	cent...	own...	cst.....	G&O*	fin.....	sing..	Berlg..	hand..	s&l-2..	West .	225
Rock Falls	9	1½	.....	150	Smh..	p-stl..	rigid..	pnu....	35x5	35x5	Mut...	wd....	Buda..	6-3½x5½-29 5	6	cent...	S-W..	cst.....	S-W..	cel.....	sing..	Bosch.	hand..	s&l-2 .	West..	none
Rowe	C.D.W.	2	3,300	....	own...	rol-c..	rigid..	sol....	34x4	36x7	H&D.	wd....	Wsc...	4-4 x5 -25.6	4	cent...	Fed...	sht.....	M-R.	.....	.....	Bosch.	.....	none..	none..	none
Rowe	C.D.W.	2½	3,575	....	own...	rol-c..	rigid..	sol....	34x4	36x4d	H&D.	wd....	Wsc...	4-4 x5 -25.6	4	cent...	Fed...	sht.....	M-R.	.....	.....	Bosch.	.....	none..	none..	none
Rowe	D.E.W.	3	3,900	....	own...	rol-c..	rigid..	sol....	36x5	36x5d	H&D.	wd....	.....	4-4 x6 -25.6	4	cent...	Fed...	sht.....	M-R.	.....	.....	Bosch.	.....	none..	none..	none
Rowe	D.G.W.	3	4,950	170	own...	rol-c..	.....	pnu....	38x7	42x9	own*..	mt*...	H-S..	8-3½x5 -33.8	..	cent...	M-R..	sht.....	M-R..	cel.r.....	.....	A-Knt	auto..	sl&i...	West..	none
Rowe	F.W.	5	5,390	....	own...	rol-c..	rigid..	sol....	36x6	40x6d	H&D.	wd....	Wsc...	4-4½x5½-36.2	2	cent...	Fed*.	sht.....	.....	.....	.....	Bosch.	.....	.....	.....	.....
Sandow	C	1	1,895	120	Savg..	p-stl..	flex....	sol*...	34x3½	34x5	Stan..	wd....	Con...	4-3½x5 -19.6	4	ther...	own...	cst.....	Chgo..	fin.....	sing..	Eismn.	auto..	lghtg..	.....	125
Sandow	I	2	1,395	150	Savg..	p-stl..	s-flex..	sol*...	36x4	36x6	Stan..	wd....	Con...	4-3½x5 -22.5	4	cent...	own...	cst.....	Chgo..	fin.....	sing..	Eismn.	auto..	.....	.....	.....
Sandow	CG	1½	2,090	135	Savg..	p-stl..	flex....	sol*...	34x3½	34x5	Stan..	wd....	Con...	4-3½x5 -22.5	4	cent...	own...	cst.....	Chgo..	fin.....	sing..	Eismn.	auto..	.....	.....	.....
Sandow	J	2½	2,975	165	Savg..	p-stl..	s-flex..	sol*...	36x4	36x7	Stan..	wd....	Con...	4-4½x5½-27.2	4	cent...	own...	cst.....	Chgo..	fin.....	sing..	Bosch.	auto..	.....	.....	.....
Sandow	M	3½	3,975	175	Savg..	p-stl..	s-flex..	sol....	36x5	36x5d	Stan..	wd....	Con...	4-4½x5½-32.4	2	cent...	own...	cst.....	Chgo..	fin.....	sing..	Bosch.	auto..	.....	.....	.....
Sandow	L	5	4,750	175	Savg..	p-stl..	s-flex..	sol....	36x6	40x6d	Stan..	wd....	Con...	4-4½x5½-32.4	2	cent...	own...	cst.....	Chgo..	fin.....	sing..	Bosch.	auto..	.....	.....	.....
Sanford	25	2½	3,000	156	P&B..	p-stl..	s-flex..	sol....	36x4	36x4d	H&D.	wd....	Con...	4-4½x5½-27.2	4	cent...	own...	cst.....	McC..	fin.....	sing..	Bosch.	hand..	lghtg..	Vesta.	150
Sanford	35	3½	3,975	174	P&B..	p-stl..	s-flex..	sol....	36x5	36x5d	H&D.	wd....	Con...	4-4½x5½-32.4	2	cent...	own...	cst.....	McC..	fin.....	sing..	Bosch.	hand..	lghtg..	Vesta.	150
Sanford	50	5	4,750	174	P&B..	p-stl..	s-flex..	sol....	36x5	40x6d	H&D.	wd....	Con...	4-4½x5½-32.4	2	cent...	own...	cst.....	McC..	fin.....	sing..	Bosch.	hand..	lghtg..	Vesta.	150
Schacht	2-Ton	2	3,350	144	own...	rol-c..	flex....	sol....	36x4	36x7	Crn...	wd....	Buda..	4-4½x5½-29 0	4	cent...	own...	cst.....	Brem.	pln.....	sing..	Bosch	hand..	none..	none..	none
Schacht	2½-Ton	2½	3,650	156	own...	rol-c..	flex....	sol....	36x4	36x4d	Crn...	wd....	Buda..	4-4½x5½-29.0	4	cent...	own...	cst.....	Brem.	pln.....	sing..	Bosch	hand..	none..	none..	none
Schacht	3½-Ton	3½	4,150	168	own...	rol-c..	flex....	sol....	36x5	36x5d	Crn...	wd....	Buda..	4-4½x5½-29 0	4	cent...	own...	cst.....	Brem.	pln.....	sing..	Bosch	hand..	none..	none..	none
Schacht	5-Ton	5	5,150	168	own...	rol-c..	flex....	sol....	36x5	40x6d	Crn...	wd....	Buda..	4-4½x6 -32.4	4	cent...	own...	cst.....	Brem.	pln.....	sing..	Bosch.	hand..	none..	none..	none
Schwartz	B	1½	2,175	140	Prsh..	p-stl..	s-flex..	sol*...	34x3½	34x5	Sch...	wd....	Con...	4-3½x5 -22.5	4	ther...	own...	cst.....	Fed...	cel.....	sing..	Bosch.	hand..	none..	none..	none
Schwartz	C	2½	2,675	146	Prsh..	p-stl..	s-flex..	sol....	36x4	36x7	Sch...	wd....	Con...	4-4½x5½-27.2	4	cent...	own...	cst.....	Fed...	cel.....	sing..	Bosch.	hand..	none..	none..	none
Schwartz	D	5	4,500	170	Prsh..	p-stl..	s-flex..	sol....	36x6	36x6d	Sth...	mt....	Buda..	4-4½x6 -32.4	4	cent...	own...	cst.....	Fed...	cel.....	sing..	Bosch.	hand..	lghtg.	Bijur..	.....
Selden	1½A	1½	.....	137½	P&B..	p-stl..	rigid..	sol*...	34x3½	35x5	Arch..	wd....	Con...	4-3½x5 -22.5	4	ther...	Lng...	cst.....	Bush..	fin.....	sing..	Bosch.	fixed..	s&l-2..	N-E.	....
Selden	2½A	2½	.....	145	P&B..	p-stl..	flex....	sol....	36x4	36x7	Stan..	wd....	Con...	4-4½x5½-27.2	4	cent...	Lng...	cst.....	Lng...	fin.....	sing..	Eismn.	hand..	s&l-2..	N-E.	....
Selden	3½A	3½	.....	162	P&B..	p-stl..	flex....	sol....	36x5	36x10	Stan..	wd....	Con...	4-4½x5½-32.4	2	cent...	Lng...	cst.....	Lng...	fin.....	sing..	Eismn.	hand..	s&l-2..	N-E.	....
Selden	5A	5	.....	161	P&B..	p-stl..	4 x....	sol....	36x6	40x12	Stan..	mt....	Con...	4 4½x6 -36.1	2	cent...	Lng...	cst.....	Lng...	fin.....	sing..	Eismn.	hand..	s&l-2..	Conn.	....
Seneca	F-2	½	1,060	108	P&B..	p-stl..	s-flex..	pnu....	30x3½	30x3½	AWW.	wd....	LeR..	4-3½x4½-15.6	4	ther...	Kns...	prs.....	Kns...	cel.....	sing..	Conn.	hand..	sl&i..	Al-Ch	none
Service	220	1	2,245	137	own...	p-stl..	flex....	sol....	34x3½	34x5	Bim...	wd....	Buda..	4-3½x5½-19.6	4	ther...	Lng...	cst.....	Lng...	fin.....	sing..	Eismn.	hand..	s&l-2..	West..	165
Service	31	1½	2,785	150	own...	p-stl..	flex....	sol....	36x3½	36x6	Bim...	wd....	Buda..	4-4 x5½-25.6	4	cent...	Lng...	cst.....	Lng...	fin.....	sing..	Eismn.	hand..	s&l-2..	West..	165
Service	36	1½	3,215	150	own...	p-stl..	flex....	pnu....	35x5	38x7	Bim...	wd....	Buda..	4-4½x5½-29 0	4	cent...	Lng...	cst.....	Lng...	fin.....	sing..	Eismn.	hand..	s&l-2*.	West..	165
Service	51	2½	3,245	160	own...	p-stl..	flex....	sol....	36x4	36x7	Bim...	wd....	Buda..	4-4½x5½-29.0	4	cent...	Lng...	cst.....	Lng...	fin.....	sing..	Eismn.	hand..	s&l-2..	West..	165
Service	76	3½	4,235	171	own...	p-stl..	flex....	sol....	36x5	36x5d	Bim...	wd....	Buda..	4-4½x6 -32.4	4	cent...	Lng...	cst.....	Lng...	fin.....	sing..	Eismn.	hand..	s&l-2..	West..	165
Service	101	5	5,145	171½	own...	p-stl..	flex....	sol....	36x6	40x6d	Sth....	mt....	Buda..	4-4½x6 -32.4	4	cent...	Lng...	cst.....	Lng...	fin.....	sing..	Eismn.	hand..	s&l-2..	West..	165
Signal	F	1	2,650	146	Savg..	p-stl..	s-flex..	sol....	34x3½	36x6	Hay...	wd....	Con...	4-4½x5½-27.2	4	cent...	own...	cst.....	McC..	fin.....	sing..	Eismn.	fixed..	lghtg-2	N ch..	80
Signal	H	1½	2,850	146	Savg..	p-stl..	s-flex..	sol....	34x4	36x6	Hay...	wd....	Con...	4-4½x5½-27.2	4	cent...	own...	cst.....	McC..	fin.....	sing..	Eismn.	fixed..	lghtg-2	Nich..	80
Signal	J	2	3,200	150	Savg..	p-stl..	s-flex..	sol....	36x6	36x8	Hay...	wd....	Con...	4-4½x5½-27.2	4	cent...	own...	cst.....	McC..	n.....	sing..	Eismn.	fixed..	lghtg-2	Nich..	80
Signal	M	3½	4,200	168	Savg..	p-stl..	s-flex..	sol....	36x5	40x5d	Hay...	wd....	Con...	4-4½x5½-32.4	2	cent...	own...	cst.....	McC..	fin.....	sing..	Eismn.	fixed..	lghtg-2	Nich..	80

ABBREVIATIONS—Types of Construction

*—other options
amid—amidship
auto—automatic
bevl—bevel
cel—cellular
cent—centrifugal
chn—chain
cst—cast
ctr—center
cylinders cast, 2 in pairs
cylinders cast, 4 in block
cylinders cast, 3 in threes
cylinders cast, 1 singly
cyl-ends—cylinder-ends
d—dual
d-d—dry-disk
d-p—dry-plate
dpix—from both motor & driveshaft
d-rd—double reduction
d-s—drive-shaft
elec—electric
ext-d-s—external drive-shaft
ext-f-w—external front wheel
ext-g—external gear
ext-jst—external jack-shaft
ext-r-w—external rear wheel
fab—fabric
fin—finned tube
flex—flexible
fric—friction
g-p—gear pump
grv—gravity
gset—from gearset
hyd—hydraulic
ind-c—individual clutch
int-g—internal gear
int-g-4—internal gear drive on 4 wheels
int-r-w—internal rear wheel
jst—unit with jackshaft
l—left
l-b—loose ball
lghtg—lighting only
motr—unit with motor
mt—metal (wheels)
mtl—metal (universal joint)
opt—optional
pist—piston pump
plan—planetary
pln—plain tube
pnu—pneumatic
pres—pressure
prog—progressive
prs—pressed steel
p&s—pneumatics in front, solids in rear
p-stl—pressed steel
r—right
r&c—right & center
r-rd—radius rods
rol-c—rolled channel
rol-i—rolled I-beam
selec—selective
s-flex—semi-flexible
sht—sheet
s&l—starting & lighting
sl&i-2—starting, lighting & ignition, 2 unit
sol—solid
sprgs—springs
sq-t—square-tube
start—starting only
t-arm—torque arm
ther—thermo-syphon
t-p—two-point
t-t—torsion tube
vac—vacuum
wat-tube—water tube
wd—wood
w-d—multiple disk in oil
w-p—plate in oil
wr—wire
zz-t—zig-zag tube

ABBREVIATIONS—Makers of Parts

*Other Options
Acme—Acme Universal Joint Mfg. Co.
A-Knt—Atwater-Kent
Al-Ch—Allis-Chalmers
Aloy—Alloy Steel Spring
Amer—American Magneto Co.
Arch—Archibald
Arvac—Arvac Co.
Aut-L—Auto-Lite
Auto—Auto-Wheel Co.
A-W-W—Automotive Wire Wheel Co.
B&B—Ball & Ball
B-Beck—Borg & Beck
Berlg—Berling
Bet—Betts Spring Co.
Bim—Bimel
B-Lipe—Brown-Lipe
Blood—Blood Bros.
Brem—Bremer
Bvr—Beaver Mfg. Co.
B&W—B & W Mfg. Co.
Can—Candler Radiator
Cant—Canton-Cleveland
Carl—Carleton Co.
Cart—Carter Carburetor
Cas—G. M. Castle
CAS—C. A. S. Products
Chgo—Chicago Mfg. Co.
Chic—Chicago-Standard
Chmp—Champion Auto Spring Co.
Chy—Cheney
Clrk—Clark Equipment
Col—Columbia Axle Co.
Con—Continental Motor
Conn—Connecticut
Crn—Crane & Mac-Mahon Co.
C-S—Christopher Simpson Iron Co.
Day—Dayton
Del—Delaney
Detlaf—Detlaff

Gasoline Motor Trucks for 1920—Cont.

ENGINE									TRANSMISSION										BRAKES		CONTROL			UNIVERSALS		
GOVERNOR			SPEED		FUEL SYS.		CLUTCH		GEARSET				FINAL DRIVE								STEERING GEAR					
Type	Make	Drive	Motor in r.p.m.	Truck in m.p.h.	Carbureter Make	Fuel Feed	Type	Make	Type	Make	Placed	Speeds	Type	Rear Axle Make	Total Gear Reduction	Propulsion Taken By	Torque Taken By	Springs Make	Foot	Hand	Placed	Make	Levers	Type	Make	Name and Model
cent.	own...	motor	1000	12	own...	pres...	d-d...	own...	selec...	own...	amid..	4	worm.	own...	10.00	r-rd...	t-arm.	Sp-P..	ext-d-s..	int-r-w	l...	own...	l&c.	mtl*	Spicer*	Packard 4-E
cent.	own...	motor	1000	11	own...	pres...	d-d...	own...	selec...	own...	amid..	4	worm.	own...	10.66	r-rd...	t-arm.	Sp-P..	ext-d-s..	int-r-w	l...	Ross..	l&c.	mtl*	Spicer*	Packard 5-E
cent.	own...	motor	1000	11	own...	pres...	d-d...	own...	selec...	own...	amid..	4	worm.	own...	10.66	r-rd...	t-arm.	Sp-P..	ext-d-s..	int-r-w	l...	Ross..	l&c.	mtl*	Spicer*	Packard 6-E
cent.	Dplx..	motor	1200	15	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	8.5	r-Rod.	sprgs..	Perf..	int-r-w..	int-r-w	l...	Jacox.	ctr..	mtl..	Spicer..	Paige 50-18
cent.	Dplx..	motor	1050	11	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	10.3	r-Rod.	sprgs..	Perf..	int-r-w..	int-r-w	l...	Jacox.	ctr..	mtl..	Spicer..	Paige 51-18
suct..	Mnrch.	motor	1250	18	Stmbg.	grv...	d-d...	B-Lipe.	selec...	Fuller..	amid..	4	worm.	own...	7.75	r-rd...	sprgs..	Tuth..	ext-d-s..	int-r-w	l...	Ross..	ctr..	mtl*	Arvac*	Parker F9W
suct..	Mnrch.	motor	1030	16	Stmbg.	grv...	d-d...	B-Lipe.	selec...	Warn..	amid..	4	worm.	own...	7.80	r-rd...	sprgs..	Tuth..	ext-d-s..	int-r-w	l...	Ross..	ctr..	mtl*	K-B*...	Parker J9
cent.	Con...	motor	1100	12	Stmbg.	vac...	d-d...	B-Lipe.	selec...	Warn..	amid..	4	worm.	Timkn.	10.25	r-rd...	sprgs..	Tuth..	ext-d-s..	int-r-w	l...	Ross..	ctr..	mtl*	K-B*...	Parker M9
cent.	own...	motor	1300	16	own...	grv...	cone..	own...	selec...	own...	amid..	4	worm.	own...	8.25	r-rd...	t-arm.	Sp-P..	ext-d-s..	int-r-w	r...	own...	r...	mtl..	own...	Pierce-Arrow X4
cent.	own...	motor	1185	14	own...	grv...	cone..	own...	selec...	own...	amid..	3	worm.	own...	9.75	r-rd...	t-arm.	Sp-P..	ext-d-s..	int-r-w	r...	own...	r...	mtl..	own...	Pierce-Arrow R9
cent.	Pierce..	gset...	1500	16	Stmbg.	grv...	d-d...	B-Lipe.	.....	B-Lipe.	amid..	4	worm.	Timkn.	8.75	r-rd...	sprgs..	S-P...	int.....	int-r-w	l...	Ross..	ctr..	mtl..	Spicer..	Pioneer All Steel F
opt.	opt....	opt...	1250	25	Stmbg.	grv...	none..	.....	fric....	.....	jst....	3	chn..	own...	4.00	r-rd...	.....	Tuth..	int.....	.....	l...	own..	l...	.....	.....	Pony
cent.	Pierce..	motor	1200	15	Stmbg.	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	4	worm.	Timkn.	7.75	sprgs..	Sprgs.	Detr..	int-r-w..	int-r-w	l...	Ross..	ctr..	mtl..	Univl..	Power B
suct..	Mnrch.	motor	1800	25	Zenith.	vac...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	3	worm.	Timkn.	7.20	sprgs..	sprgs..	S-P...	int-r-w..	int-r-w	l...	Lavn..	ctr..	mtl.	Hart...	Rainier R-11
suct..	Mnrch.	motor	1800	20	Zenith.	vac...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	3	worm.	Shel...	7.80	sprgs..	sprgs..	S-P...	int-r-w..	int-r-w	l...	Lavn..	ctr..	mtl.	Hart...	Rainier R-9
suct..	Mnrch.	motor	1800	20	Zenith.	vac...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	3	worm.	Shel...	7.80	sprgs..	sprgs..	S-P...	int-r-w..	int-r-w	l...	Lavn..	ctr..	mtl.	Hart...	Rainier R-6
suct..	Mnrch.	motor	1800	15	Zenith.	vac...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	3	worm.	Shel...	8.70	sprgs..	sprgs..	S-P...	int-r-w..	int-r-w	l...	Ross..	ctr..	mtl.	Hart...	Rainier R-8
none.	none...	none..	.....	22	John...	grv...	d-d...	own...	selec...	own...	amid..	3	bevel..	own...	4.66	sprgs..	t-arm.	Penn..	ext-r-w..	int-r-w	l...	own...	l&c.	mtl.	own...	Reo F
suct..	own...	motor	1200	17	Stmbg.	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	int-g..	Torbn..	7.15	sprgs..	sprgs..	Mth*.	ext-r-w..	int-r-w	l...	Sag...	ctr..	mtl..	S i er..	Republic 10
suct..	own...	motor	1200	15	Stmbg.	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	int-g..	Torbn..	8.00	sprgs..	sprgs..	Mth*.	ext-r-w..	int-r-w	l...	Sag...	ctr..	mtl..	Spicer..	Republic 11
cent.	Pharo..	motor	1000	12	Stmbg.	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	4	int-g..	Torbn..	8.00	sprgs..	sprgs..	Mth*.	int-r-w..	int-r-w	l...	Sag...	ctr..	mtl..	Spicer..	Republic 19
cent.	Pharo..	motor	1150	12	Stmbg.	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	4	int-g..	Torbn..	10.26	sprgs..	sprgs..	Mth*.	int-r-w..	ext-d-s	l...	Sag...	ctr..	mtl..	Spic r..	Republic 20
l-b...	own...	motor	1350	14	B&B...	grv...	cone..	own...	selec...	own...	amid..	4	worm.	own...	10.00	r-rd...	t-arm.	Sp-P..	ext-d-s..	int-r-w	r...	Ross..	r...	mtl..	own...	Riker B
l-b...	own...	motor	1350	14	B&B...	grv...	cone..	own...	selec...	own...	amid..	4	worm.	own...	10.00	r-rd...	t-arm.	Sp-P..	ext-d-s..	int-r-w	r...	Ross..	r...	mtl..	own...	Riker BB
none.	none...	none..	2200	50	Rayfld.	vac...	d-p...	B-Beck.	prog...	G-Lees.	motr..	3	bevel..	Col....	4.67	sprgs..	t-arm.	Tuth..	ext-r-w..	int-r-w	l...	Gem..	l&c.	mtl..	Spicer..	Rock Falls 9
cent.	Dplx...	motor	.....	.....	Zenith.	grv...	w-d...	B-Lipe.	selec...	B-Lipe.	motr..	4	worm.	Timkn.	.....	r-rd...	sprgs..	Shel...	r-w.....	r-w.....	l...	Ross..	ctr..	mtl..	Arvac..	Rowe C.D.W.
cent.	Dplx...	motor	.....	.....	Zenith.	grv...	w-d...	B-Lipe.	selec...	B-Lipe.	motr..	4	worm.	Shel...	.....	r-rd...	sprgs..	Shel...	r-w.....	r-w.....	l...	Ross..	ctr..	mtl..	Arvac..	Rowe C.D.W.
cent.	Dplx...	motor	.....	.....	Zenith.	grv...	w-d...	B-Lipe.	selec...	B-Lipe.	motr..	4	worm.	Shel...	.....	r-rd...	sprgs..	Shel..	r-w.....	r-w.....	l...	Ross..	ctr..	mtl..	M&E..	Rowe D.E.W.
none.	none...	none..	.....	.....	Zenith.	vac...	w-d...	B-Lipe.	selec...	B-Lipe.	motr..	4	worm.	Shel...	.....	r-rd...	.....	Shel...	r-w.....	r-w.....	l...	Ross..	ctr..	mtl..	M&E..	Rowe D.G.W.
cent.	Dplx...	motor	.....	.....	Zenith.	grv...	w-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Shel...	.....	r-rd...	sprgs..	Shel...	r-w.....	r-w.....	l...	Ross..	ctr..	mtl..	M&E..	Rowe F.W.
.....	.....	.....	1200	15	Stmbg.	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	worm.	Shel...	6.05	sprgs..	sprgs..	GCS..	int.....	int-r-w	l...	Ross..	ctr..	mtl..	Spicer*	Sandow C
.....	.....	.....	1200	15	Stmbg.	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	worm.	Shel...	7.80	sprgs..	sprgs..	GCS..	int-r-w..	int-r-w	l...	Ross..	ctr..	mtl.	Spicer*	Sandow I
suct..	.....	motor	1000	15	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	4	worm.	Timkn.	9.25	sprgs..	sprgs..	GCS..	int-r-w..	int-r-w	r...	Ross..	ctr..	mtl.	Spicer*	Sandow CG
suct..	.....	motor	1100	15	Stmbg.	grv...	.....	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	9.25	r-rd...	sprgs..	GCS..	int-r-w..	int-r-w	r...	Ross..	ctr..	mtl.	Spicer*	Sandow J
suct..	.....	motor	1200	12	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	13.66	r-rd...	sprgs..	GCS..	int-r-w..	int-r-w	r...	Ross..	ctr..	mtl.	Spicer*	Sandow M
.....	.....	.....	1350	15	Stmbg.	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	int-g..	Torbn..	10.00	sprgs..	sprgs..	GCS..	ext-r-w..	int-r-w	l...	Ross..	.....	mtl.	Spicer*	Sandow L
cent.	Pierce..	motor	1000	12	Stmbg.	grv...	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	worm.	Shel...	8.75	sprgs..	sprgs..	S-P...	int-r-w..	int-r-w	l...	Ross..	ctr..	mtl*	Spicer*	Sanford 25
cent.	Pierce..	motor	1000	12	Stmbg.	grv...	d-p...	B-Beck.	selec...	B-Lipe.	amid.	4	worm.	Shel...	8.75	sprgs..	sprgs..	S-P...	int-r-w	int-r-w	l...	Ross..	ctr..	mtl*	Spicer*	Sanford 35
cent.	Pierce..	motor	1000	10	Stmbg.	grv...	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	worm.	Shel....	11.70	sprgs..	sprgs..	S-P...	int-r-w	int-r-w	l...	Ross..	ctr..	mtl*	Spicer*	Sanford 50
cent.	Dplx...	motor	1000	16	Schblr.	grv...	cone..	Hart...	selec...	own...	amid..	3	worm.	own...	8.66	r-rd...	t-arm.	Nat...	ext-d-s..	int-r-w	l...	own...	ctr..	.....	.....	Schacht 2-Ton
cent.	Dplx...	motor	1000	14	Schblr.	grv...	cone..	Hart...	selec...	own...	amid..	3	worm.	own...	9.66	r-rd...	t-arm.	Nat...	ext-d-s..	int-r-w	l...	own...	ctr..	.....	.....	Schacht 2½-Ton
cent.	Dplx...	motor	1000	12	Schblr.	grv...	cone..	Hart...	selec...	own...	amid..	3	worm.	own...	10.33	r-rd...	t-arm.	Nat...	ext-d-s..	int-r-w	l...	own...	ctr..	.....	.....	Schacht 3½-Ton
cent.	Dplx...	motor	1000	20	Schblr.	grv...	cone..	Hart...	selec...	own...	amid..	8	worm.	own...	10.33	r-rd...	t-arm.	Nat...	ext-d-s..	int-r-w	l...	own...	ctr..	.....	.....	Schacht 5-Ton
cent.	Pierce..	motor	1200	16	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	3	int-g..	Torbn..	7.50	sprgs..	sprgs..	Rowl..	ext-r-w..	ext-r-w	l...	Ross..	ctr..	mtl..	Hart...	Schwartz B
cent.	Pierce..	motor	1000	14	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	3	int-g..	Torbn..	8.10	sprgs..	sprgs..	Rowl..	ext-r-w..	int-r-w	l...	Ross..	ctr..	mtl..	Hart...	Schwartz C
cent.	Dplx...	motor	1000	12	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	4	int-g..	Torbn..	10.20	sprgs..	sprgs..	Rowl..	int-r-w..	ext-d-s	l...	Ross..	ctr..	mtl..	Hart...	Schwartz D
cent.	Pierce..	motor	1240	18	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	3	worm.	Timkn.	7.00	sprgs..	sprgs..	S-P...	int-r-w..	int-r-w	l...	Lavn..	ctr..	mtl..	Spicer..	Selden 1½A
cent.	Pierce..	motor	1148	16	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	7.75	r-rd...	sprgs..	S-P...	int-r-w..	int-r-w	r...	Gem..	ctr..	mtl..	Spicer..	Selden 2½A
cent.	Pierce..	motor	1125	14	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	8.75	r-rd...	sprgs..	S-P...	int-r-w..	int-r-w	r...	Gem..	ctr..	mtl..	Spicer..	Selden 3½A
cent.	Pierce..	motor	1100	13	Stmbg.	grv...	d-d...	Detl f.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	10.25	r-rd...	sprgs..	S-P...	int-r-w..	int-r-w	r...	Gem..	ctr..	mtl..	Spicer..	Selden 5A
none.	none...	none..	2200	40	Schblr.	vac...	d-d...	Detrt..	selec...	Detrt..	motr..	3	bevel..	Peru...	4.5	sprgs..	t-arm.	Mth..	ext-r-w..	int-r-w	l...	Ditw..	ctr..	mtl..	Unvsl..	Seneca F-2
none.	none...	none..	.....	.....	Stmbg.	vac...	d-d...	Fuller..	selec...	Fuller..	motr..	3	worm.	Timkn.	7.75	sprgs..	sprgs..	Mth..	int-r-w..	int-r-w	l...	Ross..	ctr..	mtl.	Arvac..	Service 220
cent.	Simp...	motor	1100	15	Stmbg.	grv...	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	6.80	sprgs..	sprgs..	Mth..	int-r-w..	int-r-w	l...	Ross..	ctr..	mtl*	Spicer*	Service 31
cent.	Simp...	motor	1100	18	Stmbg.	grv...	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	6.80	sprgs..	sprgs..	Mth..	int-r-w..	int-r-w	l...	Ross..	ctr..	mtl*	Spicer*	Service 36
cent.	Simp...	motor	1100	14	Stmbg.	grv...	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	7.75	sprgs..	sprgs..	Mth..	int-r-w..	int-r-w	l...	Ross..	ctr..	mtl*	Spicer*	Service 51
cent.	Simp...	motor	1000	14	Stmbg.	grv...	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	7.80	r-rd...	sprgs..	Mth..	int-r-w..	int-r-w	l...	Ross..	ctr..	mtl*	Spicer*	Service 76
cent.	Simp...	motor	1000	11	Stmbg.	grv...	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	10.25	r-rd...	sprgs..	Mth..	int-r-w..	int-r-w	l...	Ross..	ctr..	mtl*	Spicer*	Service 101
cent.	Pierce..	gset...	1188	15	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	7.75	r-rd...	sprgs..	Detr..	int-r-w..	int-r-w	l...	Ross..	ctr..	mtl.	Spicer..	Signal F
cent.	Pierce..	gset...	1400	15	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	9.25	r-rd...	sprgs..	Detr..	int-r-w..	int-r-w	l...	Ross..	ctr..	mtl.	Spicer..	Signal H
cent.	Pierce..	gset...	1400	15	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	12 0	r-rd...	sprgs..	Detr..	int-r-w..	int-r-w	l...	Ross..	ctr..	mtl.	Spicer..	Signal J
cent.	Pierce..	gset...	1516	15	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	9.25	r-rd...	sprgs..	Detr..	int-r-w..	int-r-w	l...	Ross..	ctr..	mtl.	Spicer..	Signal M

ABBREVIATIONS—Makers of Parts—(Continued)—

Detrt—Detroit G. & M.
Ditw—Ditwiler Mfg. Co.
Dneto—Dyneto
Drt—Detroit Pressed Steel Co.
Dtp—Detroit Products
Dtrt—Detroit Lubricator
Dun—Dunbar Mfg. Co.
Dur—Durston Gear Corp.
E&M—English & Merrick
E&O—Eberly & Orris
Eismn—Eisemann
Ens—Ensign Carburetor
Eric—Ericsson Mfg. Co.
Eurk—Eureka
F&H—French & Hecht
FAC—F. A. Chapper
Fed—Fedders
Flx—Flexo Mfg. Co.
Frank—Francke Co.
G&D—Gray & Davis
G&O—G & O Mfg. Co.
GCS—Garden City Springs
Gem—Gemmer
G-Lees—Grant-Lees
Grn—Greens Car Wheel
H&D—Hoopes Bros. & Darlington
Har—Harrison
Hart—Hartford
Harv—Harvey
Hay—Hayes Wheel Co.
Her—Hercules
Hig—Higgins
Hink—Hinkley
Hol—Holley
H-Shaw—Hele-Shaw
H-S—Herschell-Spillman
Hyd—Hydraulic
Idl—Ideal
Ind—Indestructible
Iron—Iron City
Jacox—Jackson-Church-Wilcox
Jck—Jackson Auto
Jns—Phineas Jones & Co.
John—Johnson Co.
Kal—Kalamazoo
Kel—Kelsey Wheel Co.
Ken—Kenosha Wheel & Darlington
Knz—Kuntz
Lavn—Lavine
LeR—Le Roi
Lght—Light Mfg. Co.
L-N—Leece-Neville Co.
Lng—Long
Lvgn—Livingston
Lyc—Lycoming
Marvl—Marvel
Mas—F. C. Mason & Co.
Mast—Master
McCn—McCanna
M&E—Merchant & Evans
McC—McCord
Mech—Mechanics Mach. Co.
Merl—Merrill Spring Co.
Miller—H. A. Miller
Mnrch—Monarch
Mod—Modine Mfg. Co.
Mot—Mott Wheel Wks.
M-R—Marlin-Rockwell
MSC—Massillon
Mth—Mather
Mut—Mutual Wheel Co.
Nat—National Spring
Natl—National Can Co.
N-E—North East
Nich—Nichols Elec. Co.
P&B—Parish & Bingham
Perk—Perkins
Pet—Peters Mach. Co.
Pfx—Perfex Radiator
Phil—Philadelphia
Phro—Pharo Mfg. Co.
Prsh—Parish Mfg. Co.
Prud—Prudden
Rayfld—Rayfield
Rem—Remy
Rowl—Wm. H. Rowland
Roy—Royer Wheel Co.
R-T—Rome-Turney
Rugl—Ruggles
Rus—Russel Car & Frdy.
Russl—Russel Axle Co.
Rut—Rutenber
R&V—Root & VanDervoort
Sag—Saginaw
Sal—Salisbury
Savg—Savage Arms
Sch—Schwarz Wheel Co.
Schblr—Schebler
Shel—Sheldon
Simp—Simplex
S-J—Shotwell-Johnson
S-M—Standard Malleable
Smh—A. O. Smith
Sth—Smith Steel Wheel
S-P—Standard Parts Co.
Splf—Splitdorf
Sp-P—Spring Perch Co.
Stan—Standard Radiator
Stand—Standard Steel Spring Co.
Sterl—Sterling Bearings
Stmbg—Stromberg
Stn—Standard Wheel Co.
S-W—Sparks-Withington
Sum—Sumter Elec. Co.
Therm—Thermoid
Timkn—Timken
Torbn—Torbensen
Tuth—Tuthill
Univl—Universal Prdts.
Unv—Universal
Unvsl—Universal Mach.
U. S.—U. S. Spring Co.
Wag—Wagner
Warn—Warner
Wau—Waukesha
West—Westinghouse
Wil-B—Wilcox Bennett
Wis—Wisconsin Parts
W-L—Ward-Leonard
W&L—Waterhouse & Lester Co.
Way—Wayne Wheel Co.
Wol—Wohlrab
Wsc—Wisconsin
Yng—Youngstown Pressed Steel Co.

Detailed Technical Specifications of

Name and Model	Tons Capacity	Chassis Price	Wheelbase, Inches	FRAME: Make	FRAME: Material	FRAME: Type	TIRES: Kind	TIRES: Size in Ins. Front	TIRES: Size in Ins. Rear	WHEELS: Make	WHEELS: Type	ENGINE: Make	ENGINE: No. Cyl. Bore and Stroke—N.A.C.C. Hp.	ENGINE: Cy'inders Cast	ENGINE: COOLING: Water Circ.	ENGINE: COOLING: Radiator: CASE: Make	ENGINE: COOLING: Radiator: CASE: Type	ENGINE: COOLING: Radiator: CORE: Make	ENGINE: COOLING: Radiator: CORE: Type	IGNITION: Type	IGNITION: Make	IGNITION: Spark Advance	ELEC. SYSTEM: Type	ELEC. SYSTEM: Make	ELEC. SYSTEM: Extra Cost $
Signal R	5	5,300	180	Savg..	p-stl..	s-flex..	sol....	36x6	40x6d	Sth..	mt...	Con..	4-4½x6 -36.2	2	cent...	own...	cst.....	McC..	fin.....	sing..	Eismn.	hand..	lghtg-2	Nich..	80
Southern A	1	1,495	....	P&B..	.....	.....	sol*	34x4	34x4	.....	wd...	Buda.	4-3½x5½-19.6	1	.....	.....	cst.....	.....	.....	sing..	Delco.	hand..	.....	.....	...
Southern B	1½	1,795	....	P&B..	p-stl..	.....	sol*	34x4	34x4	Bim...	wd...	Con..	4-3½x5 -22.5	1	.....	.....	cst.....	.....	.....	.....	Delco.	hand..	.....	.....	...
Standard 56	1	2,250	134	Prsh..	p-stl..	s-flex..	sol*	34x3½	34x4	opt...	wd...	Con..	4-3½x5 -22.5	4	cent...	Lng...	cst.....	Lng..	fin.....	sing..	Eismn.	fixed..	.....	.....	....
Standard 76	2½	3,200	140	own..	rol-c..	.....	sol....	36x4	36x6	opt...	wd...	Con..	4-4½x5½-27.2	4	cent...	Lng...	cst.....	Lng..	fin.....	sing..	Eismn.	fixed..	.....	.....	....
Standard 66	3½	4,200	160	opt...	p-stl..	s-flex..	sol....	36x5	36x5d	opt...	wd...	Con..	4-4½x5½-32.4	2	cent...	Lng...	cst.....	Lng..	fin.....	sing..	Eismn.	fixed..	.....	.....	....
Standard 86	5	5,000	160	opt...	.....	.....	sol....	36x6	40x6d	Day..	mt...	Con..	4-4½x5½-32.4	2	cent...	Lng...	cst.....	Lng..	fin.....	sing..	Eismn.	fixed..	none..	none..	none
Sterling 1½	1½	2,480	142	Smh..	p-stl..	s-flex..	opt...	36x3½	36x5	Way..	wd*.	own..	4-4 x5½-25.6	2	cent...	own...	cst.....	opt..	cel.....	sing..	Eismn.	hand..	s&l-2..	West..	....
Sterling 2½	2½	3,475	156	Smh..	p-stl..	s-flex..	opt...	36x4	36x4d	Way..	wd*.	own..	4-4½x5½-30.7	2	cent...	own...	cst.....	opt..	cel.....	sing..	Eismn.	hand..	s&l-2..	West..	....
Sterling 3½	3½	4,550	162	Smh..	p-stl..	s-flex..	sol....	36x5	40x5d	Way..	wd*.	own..	4-4½x6½-32.4	2	cent...	own...	cst.....	opt..	cel.....	sing..	Eismn.	hand..	s&l-2..	West..	....
Sterling 5-W	5	5,350	168	Smh..	p-stl..	s-flex..	sol....	36x6	40x6d	Way..	wd*.	own..	4-5 x6½-40.0	2	cent...	own...	cst.....	opt..	cel.....	sing..	Eismn.	hand..	s&l-2..	West..	....
Sterling 5-C	5	5,600	174	Smh..	p-stl..	s-flex..	sol....	36x6	40x5d	Sth...	mt...	own..	4-5 x6½-40.0	2	cent...	own...	cst.....	opt..	cel.....	sing..	Eismn.	hand..	s&l-2..	West..	none
Sterling 7½	7½	6,000	174	Smh..	p-stl..	s-flex..	sol....	36x6	40x7d	Sth...	mt...	own..	4-5 x6½-40.0	2	cent...	own...	cst.....	opt..	cel.....	sing..	Eismn.	hand..	s&l-2..	West..	none
Stewart 11	½	1,195	110	Hyd..	p-stl..	rigid..	pnu....	32x4	32x4	Way*	wd...	LeR..	4-3½x4½ 15.6	4	ther...	Bush.	cst.....	Bush..	pln.....	sing..	Eismn.	fixed..	s&l-2..	Eismn.	none
Stewart 8	1	1,650	130	Hyd..	p-stl..	rigid..	sol....	34x3½	34x4	Way*	wd...	Con..	4-3½x5 -19.6	4	ther...	Bush.	cst.....	Bush..	pln.....	sing..	Eismn.	fixed..	lght-2*	Eismn.	75
Stewart 9	1½	1,975	140	Hyd..	p-stl..	rigid..	sol....	34x3½	34x5	Way..	wd...	Con..	4-3½x5 -22.5	4	ther...	Bush.	cst.....	Bush..	pln.....	sing..	Eismn.	fixed..	lght-2*	Eismn.	75
Stewart 7	2	2,575	156	Hyd..	p-stl..	rigid..	sol....	34x4	34x7	Way*	wd...	Con..	4-4½x5½-27.2	4	cent...	Bush.	cst.....	Bush..	pln.....	sing..	Eismn.	fixed..	lght-2*	Eismn.	75
Stewart 10	3½	3,500	165	Hyd..	p-stl..	rigid..	sol....	36x5	36x5d	Clrk..	mt...	Con..	4-4½x5½-32.4	2	cent...	Bush.	cst.....	Bush..	pln.....	sing..	Eismn.	fixed..	lght-2*	Eismn.	75
Sullivan F	1½	2,350	130	own..	rol-c..	.....	sol....	36x4	36x5	Way..	wd...	Buda.	4-3½x4½-22.5	4	ther...	Bush.	sht.....	Bush..	fin.....	sing..	Bosch.	fixed..	.....	.....	....
Sullivan E	2	2,975	150	P&B..	p-stl..	s-flex..	sol....	36x4	36x7	Way..	wd...	Buda.	4-4½x5½-27.2	4	cent...	own...	cst.....	Bush..	fin.....	sing..	Bosch.	fixed..	.....	.....	....
Sullivan H	3½	.....	170	P&B..	p-stl..	.....	sol....	36x5	36x5d	Way..	wd...	Buda.	4-4½x6 -32.4	4	cent...	own...	cst.....	Bush..	fin.....	sing..	Bosch.	hand..	.....	.....	....
Tiffin GW	1½	2,300	135	P&B..	p-stl..	flex..	sol....	36x3½	36x5	Sth...	mt...	Con..	4-4½x5½-27.2	4	cent...	own...	cst.....	G&O..	fin.....	sing..	Bosch.	hand..	sl&i...	West..	175
Tiffin MW	2½	3,050	148	P&B..	p-stl..	flex..	sol....	36x4	36x3½d	Sth...	mt...	Con..	4-4½x5½-27.2	4	cent...	own...	cst.....	G&O..	fin.....	sing..	Bosch.	hand..	sl&i...	West..	175
Tiffin PW	3½	3,980	160	own..	rol-c..	s-flex..	sol....	36x5	36x5d	Sth...	mt...	Con..	4-4½x5½-32.4	2	cent...	own...	cst.....	G&O..	fin.....	sing..	Bosch.	hand..	sl&i...	West..	175
Tiffin TW	5	5,000	168	own..	rol-i..	rigid..	sol....	36x6	40x6d	Sth...	mt...	Con..	4-4½x6 -36.2	2	cent...	own...	cst.....	G&O..	fin.....	sing..	Bosch.	hand..	sl&i...	West..	200
Tiffin UW	6	5,200	168	own..	rol-i..	rigid..	sol....	36x6	40x12	Sth...	mt...	Con..	4-4½x6 -36.2	2	cent...	own...	cst.....	G&O..	fin.....	sing..	Bosch.	hand..	sl&i...	West..	200
Titan Transport	3½	4,300	162	P&B..	p-stl..	s-flex..	sol*	36x5	40x5d	Day..	mt...	Buda.	4-4½x6 -32.4	4	cent...	own...	cst.....	B&W.	zz-t....	sing..	Eismn.	hand..	lghtg..	West..	none
Titan 5-Ton		5,150	156	P&B..	p-stl..	s-flex..	sol*	36x5	40x6d	Clrk..	mt...	Buda.	4-4½x6 -32.4	4	cent...	own...	cst.....	B&W.	zz-t....	sing..	Eismn.	hand..	lghtg..	West..	none
Traffic C	2	1,395	132	own..	rol-c..	s-flex..	sol....	34x3½	34x5	Roy...	wd...	Con..	4-3½x5 -22.5	4	ther...	own...	cst.....	own...	cel.....	sing..	Bosch.	hand..	.....	none..	none
Transport 20	1	1,750	130	.....	.....	.....	.....	34x3½	34x4	.....	.....	Con..	4-3½x5 -22.5	..	ther...	.....	.....	.....	cel.....	.....	Eismn.	.....	.....	.....	.....
Transport 30	1½	2,050	140	.....	.....	.....	.....	36x3½	36x5	.....	.....	Con..	4-3½x5 -22.5	..	ther...	.....	.....	.....	cel.....	.....	Eismn.	.....	.....	.....	.....
Transport 50	2	2,585	150	.....	.....	.....	.....	36x4	36x6	.....	.....	Con..	4-4½x5½-27.2	..	pist...	.....	.....	.....	cel.....	.....	Eismn.	.....	.....	.....	.....
Triangle A	1½	2,185	144	Mas..	rol-c..	s-flex..	sol*....	34x3½	34x6	Hay*.	wd...	Wau..	4-3½x5½-22.5	4	cent...	Pfx..	prs.....	Pfx..	zz-t....	sing..	Eismn.	fixed..	none..	none..	none
Triangle B	2½	2,850	151	Mas..	rol-c..	s-flex..	sol*....	36x4	36x7	Roy...	wd...	Rut...	4-4½x5½-27.2	2	cent...	Pfx..	prs.....	Pfx..	zz-t....	sing..	Eismn.	hand..	none..	none..	none
Union F	2½	2,675	152	own..	p-stl..	rigid..	sol*	36x4	36x7	Prud..	wd...	Wsc...	4-4 x6 -25.6	4	cent...	own...	cst.....	G&O..	fin.....	sing..	Eismn.	hand..	lghtg..	Eismn.	.75
Union H	4	3,500	171	own..	p-stl..	rigid..	sol....	36x6	36x10	Sth...	mt...	Wsc...	4-4½x6 -32.4	4	cent...	own...	cst.....	G&O..	fin.....	sing..	Eismn.	hand..	lghtg..	Eismn.	.75
United A	1½	.....	145	.....	p-stl..	flex..	sol.*	34x3½	34x5	.....	wd...	Buda.	4-3½x5½-22.5	4	cent...	own...	cst.....	.....	.....	sing..	Eismn.	hand..	.....	.....	....
United B	2½	.....	151	.....	p-stl..	flex..	sol.*	36x4	36x7	.....	wd...	Buda.	4-4½x5½-29.0	4	cent...	own...	cst.....	.....	.....	sing..	Eismn.	hand..	.....	.....	....
United C	3½	.....	157	.....	p-stl..	flex..	sol....	36x5	36x5d	.....	nt...	Buda.	4-4½x5½-29.0	4	cent...	own...	cst.....	.....	.....	sing..	Eismn.	hand..	.....	.....	....
United V	5	.....	160	.....	p-stl..	flex..	sol.	36x5	40x6d	.....	mt...	Buda.	4-4½x6 -32.4	4	cent...	own...	cst.....	.....	.....	sing..	Eismn.	hand..	.....	.....	....
U. S. N	1½	2,150	144	own..	p-stl..	flex..	sol*	36x3½	36x5	Sch..	wd...	Con..	4-3½x5 -22.5	4	cent.	Lng...	cst.....	Lng..	fin.....	sing..	Eismn.	hand..	s&l-2*.	G&D*.	185
U. S. H	2½	3,250	144	own..	rol-c..	flex..	sol*	34x4	36x4d	Sch..	wd...	Con..	4-4½x5½-27.2	4	cent...	Fed..	sht.....	Fed..	cel.....	sing..	Eismn.	hand..	lghtg..	Eismn.	125
U. S. J	3½	3,950	162	own..	rol-c..	flex..	sol....	36x5	40x5d	Sch..	wd...	Con..	4-4½x5½-32.4	2	cent...	Fed..	sht.....	Fed..	cel.....	sing..	Eismn.	hand..	lghtg..	Eismn.	125
U. S. K	5	4,850	168	own..	rol-c..	flex..	sol....	36x5	40x6d	Sth*.	mt...	Wau..	4-4½x6½-36.2	2	cent...	Fed..	sht.....	Fed..	cel.....	sing..	Eismn.	hand..	lghtg..	Eismn.	125
Velie 46	1½	1,925	133	Dun..	p-stl..	s-flex..	sol....	36x3½	36x5	Bim...	wd...	Con..	4-3½x5 -22.5	4	cent...	own...	cst.....	Lng..	fin.....	sing..	Bosch.	hand..	none..	none..	none
Velie 26-B	3½	3,900	174	Smh..	p-stl..	s-flex..	sol....	36x5	36x5d	Prud..	wd...	Con..	4-4½x5½-32.4	2	cent...	own...	cst.....	R-T...	fin.....	sing..	Bosch.	hand..	none..	none..	none
Victor A	1½	1,950	140	own..	rol-c..	rigid..	sol*....	34x4	34x5	Bim...	wd...	Con..	4-3½x5 -22.5	4	ther...	Mod..	cst.....	Mod..	fin.....	dual..	Eismn.	fixed..	lghtg..	Eismn.	100
Victor B	2	2,225	140	own..	rol-c..	rigid..	sol*....	34x4	34x5	Bim...	wd...	Con..	4-3½x5 -22.5	4	ther...	Mod..	cst.....	Mod..	fin.....	dual..	Eismn.	fixed..	lghtg..	Eismn.	100
Vim 27	½	1,095	108	P&B..	p-stl..	s-flex..	pnu....	31x4	31x4	H&D	wd...	own..	4-3 x4½-14.4	4	ther...	McC..	prs.....	McC..	fin.....	sing..	A-Knt	hand..	lghtg..	West..	none
Vim 28	½	1,350	127	P&B..	p-stl..	s-flex..	pnu....	32x4½	32x4½	H&D.	wd...	own..	4-3 x4½-14.4	4	ther...	McC..	prs.....	McC..	fin.....	sing..	A-Knt	hand..	lghtg..	West..	none
Vim 25	1	2,195	125	P&B..	p-stl..	s-fl x..	pnu....	35x5	35x5	H&D.	wd...	Her...	4-3½x5½-22.5	4	g-p...	McC..	cst.....	McC..	fin.....	sing..	Spltf..	hand..	none..	none..	none
Vim 22	2	3,150	142	P&B..	p-stl..	s-fl x..	sol....	36x4	36x6	Sth...	mt...	Her...	4-3½x5½-22.5	4	g-p...	McC..	cst.....	McC..	fin.....	sing..	Spltf..	hand..	none..	none..	none
Vim 23	3	3,950	175	P&B..	p-stl..	s-flex..	sol....	36x5	36x5d	Sth...	mt....	Her...	4-4½x5½-28.9	4	cent...	McC..	cst.....	McC..	fin.....	sing..	Spltf..	hand..	none..	none..	none
Walker-Johnson B	2½	2,890	175	P&B..	p-stl..	s-flex..	sol*....	36x4	36x8	Arch..	wd...	Buda.	4-4½x5½-29.0	4	cent...	Bush..	cst.....	Bush..	fin.....	sing..	Eismn.	hand..	none..	none..	none
Walter Tractor M.O.-35	3	.....	108	own..	rol-c..	rigid..	sol....	40x4d	40x4d	own..	mt...	own..	4-4½x6 -30.7	4	cent...	.....	sht.....	.....	.....	sing..	Amer.	hand..	none..	none..	none
Walter S	5	.....	168	own..	p-stl..	flex..	sol....	36x6	40x6d	Day..	mt...	Wau..	4-4½x6½-32.4	2	cent...	Bush.	cst.....	Bush..	fin.....	sing..	Bosch.	hand..	s&l-2..	West..	none
Ward-La France 2B	2½	.....	158	own..	p-stl..	flex..	sol*....	36x4	36x7	H&D	wd...	.....	4-4½x5½-36.2	2	cent...	own...	cst.....	Lng..	fin.....	sing..	opt..	hand..	lghtg..	vesta..	125
Ward-La France 4A	3½	.....	158	own..	p-stl..	s-flex..	sol*....	36x5	36x5d	Steel	.....	.....	4-4½x6½-32.4	2	cent...	own...	cst.....	Lng..	fin.....	sing..	opt..	hand..	lghtg..	vesta..	125
Ward-La France 5A	5	.....	160	own..	p-stl..	s-flex..	sol*....	36x6	40x6d	Steel	.....	.....	4-5 x6½-40.0	2	cent...	own...	cst.....	Lng..	fin.....	sing..	opt..	hand..	lghtg..	vesta..	125
Ware A-3½	3½	3,500	136	Drt...	rol-i..	.....	sol....	36x6	36x5d	opt...	wd...	H-S...	4-3½x5 -19.6	4	ther...	.....	cst.....	.....	cel.....	sing..	.....	.....	none..	none..	....
Watson 3½	3½	.....	168	Prsh..	p-stl..	rigid..	sol....	36x5	36x10	Crn...	wd...	Con..	4-4½x5½-32.4	2	cent...	own...	cst.....	R-T...	fin.....	sing..	Simms	hand..	none..	none..	none
White 15	¼	2,400	133½	.....	rol-i..	s-flex..	pnu....	34x4½	34x4½	.....	nt...	own..	4-3½x5½-22.5	4	cent...	.....	sht.....	.....	cel.....	dual..	.....	auto..	.....	.....	....
White 30	2	3,300	157½	.....	p-stl..	s-flex..	sol*....	36x4*	36x7*	.....	nt...	own..	4-3½x5½-22.5	4	cent...	.....	sht.....	.....	cel.....	dual..	.....	auto..	.....	.....	....
White 40	3	4,300	174	.....	rol-i..	rigid..	sol....	36x5	40x5d	.....	mt...	own..	4-3½x5½-22.5	4	cent...	own...	cst.....	.....	fin.....	dual..	.....	auto..	.....	.....	....
White 45	5	5,000	174	.....	rol-i..	rigid..	sol....	36x6	40x6d	.....	mt...	own..	4-4½x5½-29.0	4	cent...	own...	cst.....	.....	fin.....	dual..	.....	auto..	.....	.....	....
Wichita L	1½	2,350	144	.....	.....	.....	sol....	36x3½	36x5	.....	.....	own..	4-3½x5 -19.6	..	ther...	Pfx..	.....	Pfx..	.....	.....	.....	.....	.....	.....	.....
Wichita M	2	2,750	144	.....	.....	.....	sol....	36x4	36x6	.....	.....	Wau..	4-3½x5½-22.5	..	g-p...	Pfx..	.....	Pfx..	.....	.....	Bosch.	.....	.....	.....	.....
Wichita R	2½	2,950	144	.....	.....	.....	sol....	36x4	36x7	.....	.....	Wau..	4-3½x5½-22.5	..	g-p...	Pfx..	.....	Pfx..	.....	.....	.....	.....	.....	.....	.....
Wichita O	3½	3,750	165	.....	.....	.....	sol....	36x5	36x5d	.....	.....	Wau..	4-4½x5½-32.4	..	cent...	E-M..	.....	E-M..	.....	.....	.....	.....	.....	.....	.....
Wichita S	6	5,400	165	.....	.....	.....	sol....	36x6	40x6d	.....	.....	Bvr...	4-4½x6 -32.4	..	.....	E-M..	.....	E-M..	.....	.....	.....	.....	.....	.....	.....
Wilcox A-1	1	.....	130	Smh	p-stl..	flex..	pnu*.	35x5	35x5	Crn...	wd...	Buda.	4-3½x5½-22.5	4	cent...	own...	cst.....	Lng..	fin.....	sing..	Bosch.	hand..	lghtg..	none..	none
Wilcox B	1½	.....	144	Smh..	p-stl..	flex..	sol....	36x4	36x5	Sth...	mt...	own..	4-4½x5 -29.0	2	cent...	own...	cst.....	Lng..	fin.....	sing..	Bosch.	hand..	lghtg..	none..	none
Wilcox C	2½	.....	150	Smh..	p-stl..	flex..	sol....	36x4	36x3½d	Sth...	mt...	own..	4-4½x6-34 0.	2	cent...	own...	cst.....	Lng..	fin.....	sing..	Bosch.	hand..	lghtg..	none..	none
Wilcox E	3½	.....	162	Smh..	p-stl..	flex..	sol....	36x5	36x5d	Sth...	mt...	Buda.	4-4½x5-29.0	2	cent...	own...	cst.....	Lng..	fin.....	sing..	Bosch.	hand..	lghtg..	none..	none
Wilcox W	5	.....	162	Smh..	p-stl..	flex..	sol....	36x5	40x6d	Sth...	mt...	Wau..	4-4½x6½-36.2	2	cent...	own...	cst.....	Lng..	fin.....	sing..	Bosch.	hand..	lghtg..	.....	....
Wilson F	1½	2,450	136	.....	rol-c..	s-flex..	sol....	36x3½	36x5	.....	wd...	Con..	4-3½x5-22.5	4	ther...	own...	cst.....	Lng..	fin.....	sing..	Eismn.	hand..	lghtg..	.....	....
Wilson EA	2½	3,150	152	.....	rol-c..	s-flex..	sol....	36x4	36x7	.....	wd...	Con..	4-4½x5½-27.2	4	cent...	own...	cst.....	Lng..	fin.....	sing..	Eismn.	hand..	lghtg..	.....	....
Wilson G	3½	3,950	160	.....	rol-c..	s-flex..	sol....	36x5	36x5d	.....	mt...	Con..	4-4½x5½-32.4	2	cent...	own...	cst.....	Lng..	fin.....	sing..	Eismn.	hand..	lghtg..	.....	....
Wilson H	5	4,800	160	.....	rol-c..	s-flex..	sol....	36x6	40x6d	.....	nt...	Con..	4-4½x5½-32.4	2	cent...	own...	cst.....	Lng..	fin.....	sing..	Eismn.	hand..	lghtg..	.....	....
Winther-Marwin 430-A	1½	.....	132	own..	rol-c..	s-flex..	sol*	32x4	32x4	own..	mt...	Wsc...	4-3½x5 -22.5	4	cent...	own...	cst.....	Brem.	pln.....	sing..	Eismn.	hand..	s&l-2*.	Eismn*	....
Winther-Marwin 459	2½	.....	152	own..	rol-c..	s-flex..	sol....	34x5	36x6	own..	mt...	Wsc...	4-4 x5 -25.6	4	cent...	own...	cst.....	Brem.	pln.....	sing..	Eismn.	hand..	s&l-2*.	Bijur..	....
Winther-Marwin 479	3½	.....	158	own..	rol-c..	s-flex..	sol....	36x6	36x5d	own..	mt...	Wsc...	4-4½x6 -29.0	4	cent...	own...	cst.....	Brem.	pln.....	sing..	Eismn.	hand..	s&l-2*.	Eismn*	....
Winther 39	1½	.....	140	own..	rol-c..	s-flex..	sol....	34x3½	34x5	own..	mt...	Wsc...	4-3½x5 -22.5	4	cent...	own...	cst.....	Brem.	pln.....	sing..	Eismn.	hand..	s&l-2*.	Eismn*	....
Winther 49A	2	.....	147	own..	rol-c..	s-flex..	sol....	34x4	34x4d	own..	mt...	Wsc...	4-4 x5 -25.6	4	cent...	own...	cst.....	Brem.	pln.....	sing..	Eismn.	hand..	s&l-2*.	Bijur..	....
Winther 69	3	.....	150	own..	rol-c..	s-flex..	sol....	36x6	36x5d	Clrk..	mt...	Wsc...	4-4 x6 -25.6	4	cent...	own...	cst.....	Brem.	pln.....	sing..	Eismn.	hand..	s&l-2*.	Bijur..	....
Winther 979	3½	.....	168	own..	rol-c..	s-flex..	pnu....	38x7	42x9	own..	mt...	Wsc...	4-4½x6 -32.4	4	cent...	own...	cst.....	Brem.	pln.....	sing..	Eismn.	hand..	s&l*...	Bijur..	....
Winther 89	4	.....	156	own..	rol-c..	s-flex..	sol....	36x5	40x5d	Clrk..	mt...	Wsc...	4-4½x6 -29.0	4	cent...	own...	cst.....	Brem.	pln.....	sing..	Eismn.	hand..	s&l*...	Bijur..	....

See preceding pages for abbreviations.

Gasoline Motor Trucks for 1920—Cont.

ENGINE										TRANSMISSION											BRAKES		CONTROL			UNIVERSALS		
GOVERNOR			SPEED		FUEL SYS.		CLUTCH			GEARSET				FINAL DRIVE									STEERING GEAR					
Type	Make	Drive	Motor in r.p.m.	Truck in m.p.h.	Carbureter Make	Fuel Feed	Type	Make		Type	Make	Placed	Speeds	Type	Rear Axle Make	Total Gear Reduction	Propulsion Taken By	Torque Taken By	Springs Make		Foot	Hand	Placed	Make	Levers	Type	Make	Name and Model
cent.	Pierce..	gset...	1180	12	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.		11.66	r-rd...	sprgs..	Detr..		int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Spicer..	Signal	R
cent.	Pierce..	.....	.....	.....	Zenith.	.....	.....	B-Beck.	.....	.....	.....	.....	.....	Chic..	.....	.....	.....	.....	.....		.....	.....	.....	.....	.....	mtl..	Spicer..	Southern	A
cent.	Pierce..	.....	.....	.....	Zenith.	.....	.....	B-Beck.	.....	.....	.....	.....	.....	Chic..	.....	.....	.....	sprgs..	.....		.....	.....	.....	Ross..	.....	mtl..	Spicer..	Southern	B
suct..	Mnrch.	motor	1200	18	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	3	worm.	Timkn.		7.20	sprgs..	sprgs..	Stand.		int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Spicer..	Standard	S6
suct..	Mnrch.	motor	1200	15	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.		7.75	r-rd...	.....	Stand.		int-r-w..	int-r-w..	l...	Ross..	ctr..	mtl..	Spicer..	Standard	76
suct..	Mnrch.	motor	1100	12	Stmbg.	vac...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.		10.33	r-rd...	.....	Stand.		int.-r-w.	int-r-w..	l...	Gem..	ctr..	mtl..	Spicer..	Standard	66
suct..	Mnrch.	motor	1090	10	Stmbg.	vac...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.		13.66	r-rd...	sprgs..	Stand.		int-r-w.	int-r-w..	l...	Gem..	ctr..	mtl..	Spicer..	Standard	86
cent.	Wau...	motor	1000	16	Rayfld.	vac...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	4	worm.	Timkn.		7.00	r-rd...	sprgs..	Mth..		int-r-w.	int-r-w..	l...	Ross..	ctr..	mtl..	Spicer..	Sterling	1½
cent.	Wau...	motor	1000	16	Rayfld.	vac...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	4	worm.	Timkn.		7.70	r-rd...	sprgs..	Mth..		int-r-w.	int-r-w..	l...	Ross..	ctr..	mtl..	Spicer..	Sterling	2½
cent.	Wau...	motor	1000	13	Rayfld.	vac...	w-d...	M&E..	ind-c...	own...	amid..	3	worm.	Timkn.		8.75	r-rd...	sprgs..	Mth..		int-r-w.	int-r-w..	l...	Ross..	ctr..	mtl..	Unvsl*	Sterling	3½
cent.	Wau...	motor	1000	13	Rayfld.	vac...	w-d...	M&E..	ind-c...	own...	amid..	3	worm.	Timkn.		8.80	r-rd...	sprgs..	Mth..		int-r-w.	int-r-w..	l...	Ross..	ctr..	mtl..	Unvsl*	Sterling	5–W
cent.	Wau...	motor	1000	7	Rayfld.	vac...	w-d...	M&E..	ind-c...	own...	amid..	6	chn..	own...		7.04	r-rd...	.....	Mth..		int-r-w.	int-d-s	l...	Ross..	ctr..	mtl..	Unvsl..	Sterling	5–C
cent.	Wau...	motor	1000	8	Rayfld.	vac...	w-d...	M&E..	ind-c...	own...	amid..	6	chn..	own...		7.26	r-rd...	.....	Mth..		int-r-w.	int-d-s	l...	Ross..	ctr..	mtl..	Unvsl..	Sterling	7½
none.	none...	none..	1400	22	Zenith.	grv...	d-p...	B-Beck.	selec...	Dur...	motr..	3	int-g..	Clrk...		6.00	sprgs..	sprgs..	Detr..		ext-r-w.	ext-d-s	l...	CAS..	ctr..	mtl..	Hart..	Stewart	11
suct..	Mnrch.	motor	1200	20	Zenith.	grv...	d-p...	B-Beck.	selec...	Dur...	motr..	3	int-g..	Clrk...		6.80	sprgs..	sprgs..	Detr.		ext-r-w.	ext-d-s	l...	Gem..	ctr..	mtl..	Hart..	Stewart	8
suct..	Mnrch.	motor	1250	18	Zenith.	grv...	d-p...	Fuller..	selec...	Fuller..	motr..	3	int-g..	Clrk...		7.60	sprgs..	sprgs..	Detr.		ext-r-w.	ext-d-s	l...	Gem..	ctr..	mtl..	Hart..	Stewart	9
cent.	Pierce..	motor	1100	14	Zenith.	grv...	d-p...	Fuller..	selec...	Fuller..	motr..	3	int-g..	Clrk...		9.00	sprgs..	sprgs..	Detr*		ext-r-w.	ext-d-s	l...	Ross..	ctr..	mtl..	Hart..	Stewart	7
cent.	Pierce..	motor	1120	12	Zenith.	grv...	d-p...	Fuller..	selec...	Fuller..	motr..	4	int-g..	Clrk...		10.00	sprgs..	sprgs..	Iron..		ext-r-w.	ext-d-s	l...	Ross..	ctr..	mtl..	Hart..	Stewart	10
none.	none...	none..	.....	.....	Stmbg.	grv...	cone..	.....	selec...	Covert.	amid..	3	worm.	Timkn.		8.50	sprgs..	sprgs..	Merl..		int-r-w.	int-r-w.	l...	Ross..	ctr..	mtl..	Hart..	Sullivan	F
none.	none...	none..	.....	.....	Stmbg.	vac...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	3	worm.	Timkn.		7.75	sprgs..	sprgs..	Shel..		int-r-w.	int-r-w.	l...	Ross..	ctr..	mtl..	Spicer..	Sullivan	E
none.	none...	none..	.....	.....	Stmbg.	vac...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.		10.33	r-rd...	sprgs..	Shel..		int-r-w.	int-r-w.	l...	Ross..	ctr..	mtl..	Spicer..	Sullivan	H
cent.	Pierce..	motor	1000	13½	Schblr..	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	worm.	Shel...		7.75	r-rd...	sprgs..	Kal...		int-r-w.	int-r-w.	l...	Ross..	ctr..	mtl.	Pet....	Tiffin	GW
cent.	Pierce..	motor	1000	12	Schblr..	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	4	worm.	Shel...		8.70	r-rd...	sprgs..	Kal...		int-r-w.	int-r-w.	l...	Ross..	ctr..	mtl	Pet....	Tiffin	MW
cent.	Pierce..	motor	1000	12	Schblr..	grv...	d-p...	B-Beck.	selec...	Fuller..	amid..	4	worm.	Shel...		8.70	r-rd...	sprgs..	Kal...		int-r-w.	int-r-w.	l...	Ross..	ctr..	mtl	Pet....	Tiffin	PW
cent.	Pierce..	motor	1000	10	Schblr..	grv...	d-p...	B-Beck.	selec...	Covert.	amid..	4	worm.	Shel...		11.75	r-rd...	sprgs..	Kal...		int-r-w.	int-r-w.	l...	Ross..	ctr..	mtl	Pet....	Tiffin	TW
cent.	Pierce..	motor	1000	9	Schblr..	grv...	d-p...	B-Beck.	selec...	Covert.	amid..	4	worm.	Shel...		13.00	r-rd...	sprgs..	Kal...		int-r-w.	int-r-w.	l...	Ross..	ctr..	mtl	Pet....	Tiffin	UW
cent.	Simp...	motor	1050	12	Stmbg.	grv...	d-p...	.....	ind-c...	Cotta..	amid..	4	int-g..	Clrk...		8.00	r-rd...	sprgs..	Shel..		int-r-w.	ext-d-s	l...	Lavn..	ctr..	mtl.	Unvsl..	Titan	Transport
cent.	Simp...	motor	1050	12	Stmbg.	grv...	d-p...	.....	ind-c...	Cotta..	amid..	4	int-g..	Clrk...		11.00	r-rd...	sprgs..	Shel..		int-r-w.	est-d-s	l...	Lavn..	ctr..	mtl.	Unvsl..	Titan	5–Ton
none.	none...	none..	1300	16	Cart...	grv...	d-d...	Covert.	selec...	Covert.	motr..	3	int-g..	Russl..		8.20	sprgs..	sprgs..	Detr..		ext-r-w.	int-r-w	l...	Ditw..	ctr..	mtl*	Unvsl..	Traffic	C
.....	Simp...	.....	.....	.....	Stmbg.	.....	.....	Fuller..	.....	Fuller..	.....	3	int-g..	Clrk...		.....	.....	.....	Detr..		.....	.....	.....	Jacox..	.....	fab..	Therm.	Transport	20
.....	Simp...	.....	.....	.....	Stmbg.	.....	.....	Fuller..	.....	Fuller..	.....	3	int-g..	Clrk...		.....	.....	.....	Detr..		.....	.....	.....	Jacox..	.....	mtl..	Arvac..	Transport	30
.....	Dplx...	.....	.....	.....	Stmbg.	.....	.....	Fuller..	.....	Fuller..	.....	4	int-g..	Clrk...		.....	.....	.....	Detr..		.....	.....	.....	Jacox..	.....	mtl..	Arvac..	Transport	50
cent.	Wau...	motor	1450	18	Stmbg.	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	int-g..	Clrk...		6.80	sprgs..	sprgs..	Detr..		ext-d-s.	ext-r-w	l...	Gem..	ctr..	mtl.	Unvsl..	Triangle	A
cent.	Pierce..	motor	1350	16	Stmbg.	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	4	int-g..	Clrk...		8.00	sprgs..	sprgs..	Detr..		ext-d-s.	ext-r-w	l...	Gem..	ctr..	mtl.	Unvsl..	Triangle	B
cent.	Dplx...	motor	1100	15	Schblr..	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	4	int-g..	Russl..		7.80	sprgs..	sprgs..	Mth..		ext-r-w..	int-r-w	l...	Ross..	ctr..	mtl.	Univ ..	Union	F
cent.	Dplx...	motor	1100	12	Schblr..	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	4	int-g..	Torbn..		10.25	sprgs..	sprgs..	Mth..		ext-r-w..	ext-d-s	l...	Ross..	ctr..	mtl.	Univl..	Union	H
cent.	Dplx...	motor	1000	16	Stmbg.	pres...	d-d...	Fuller..	selec...	.....	motr..	3	int-g..	Clrk...		7.00	sprgs..	sprgs..	.....		xt-r-w..	ext-r-w	l*	.....	ctr..	.....	.....	United	A
cent.	Dplx...	motor	1000	14	Stmbg.	pres...	d-d...	Fuller..	selec...	.....	amid..	4	int-g..	Clrk...		8.15	sprgs..	sprgs..	.....		xt-r-w..	ext-r-w	l*	.....	ctr..	.....	.....	United	B
cent.	Dplx...	motor	1000	12	Stmbg	pres...	d-d...	Fuller..	selec...	.....	amid..	4	int-g..	Clrk...		10.00	sprgs..	sprgs..	.....		xt-r-w..	xt-r-w	l*	.....	ctr..	.....	.....	United	C
cent.	Dplx...	motor	.....	10	Stmbg.	pres...	d-d...	Fuller..	selec...	.....	amid..	4	int-g..	Clrk...		12.50	sprgs..	sprgs..	.....		ext-r-w..	xt-r-w	l*	.....	ctr..	.....	.....	United	V
suct..	Mnrch.	motor	1400	19.8	Stmbg.	vac...	d-d...	B-Lipe.	prog...	B-Lipe.	motr..	3	int-g..	Clrk...		7.60	sprgs..	sprgs..	Shel...		ext-r-w..	int-r-w	l...	Lavn..	ctr..	mtl..	Blood..	U. S	N
cent.	Pierce..	motor	1160	14.2	Stmbg.	grv...	cone..	Hart...	prog...	B-Lipe.	amid..	4	worm.	Shel...		8.75	sprgs..	sprgs..	Shel...		int-r-w..	int-r-w	l...	Lavn..	ctr..	mtl..	Blood..	U. S	H
cent.	Pierce..	motor	1090	11.0	Stmbg.	grv...	cone..	Hart...	prog...	B-Lipe.	amid..	4	worm.	Shel...		11.75	sprgs..	sprgs..	Shel...		int-r-w..	int-r-w	l...	Lavn..	ctr..	mtl..	Blood..	U. S	J
cent.	Wau...	motor	950	12.9	Stmbg.	grv...	d-p...	B-Beck.	ind-c...	Cotta..	amid.	3	worm.	Shel...		8.70	r-rd...	sprgs..	Shel...		int-r-w..	int-r-w	l...	Lavn..	ctr..	mtl..	Blood..	U. S	K
suct..	Mnrch.	motor	.....	18	Stmbg.	grv...	d-p...	B-Beck.	selec...	Dur...	motr..	3	int-g..	Torbn..		8.00	sprgs..	sprgs..	Mth..		ext-r-w..	int-r-w	l...	Gem..	ctr..	mtl..	Arvac..	Velie	46
cent.	Pierce..	motor	.....	14	Stmbg.	vac...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.		10.30	r-rd...	sprgs..	Mth..		int-r-w..	int-r-w	l...	Gem..	ctr..	mtl..	Spicer..	Velie	26–B
none.	none...	none..	.....	.....	Stmbg.	grv...	w-d...	Fuller..	prog...	Fuller..	motr..	3	int-g*.	Clrk...		7.00	sprgs..	.....	Tuth..		.....	int-r-w	l...	Ross..	ctr..	mtl..	Acme..	Victor	A
none.	none...	none..	.....	.....	Stmbg.	grv...	w-d...	Fuller..	prog...	Fuller..	motr..	3	int-g*.	Clrk...		7.00	sprgs..	.....	Tuth..		.....	int-r-w	l...	Ross..	ctr..	mtl	Acme..	Victor	B
none.	none...	none	1200	25	Zenith.	grv...	cone..	own...	selec...	own...	mctr..	3	worm.	Shel...		5.50	sprgs..	sprgs..	Shel...		int-r-w..	int-r-w	l...	Jacox.	ctr..	mtl..	Spicer..	Vim	27
none.	none...	none.	1200	25	Zenith.	grv.	cone..	own...	selec...	own...	motr..	3	worm.	Shel...		5.50	sprgs..	sprgs..	Shel...		int-r-w..	int-r-w	l...	Jacox.	ctr..	mtl..	Spicer..	Vim	28
none.	none...	none..	1600	30	Zenith.	grv...	d-d..	B-Lipe	selec...	B-Lipe.	motr..	3	worm.	Shel...		6.50	sprgs..	sprgs..	Shel...		int-r-w..	int-r-w	l...	Jacox.	ctr..	mtl..	Spicer..	Vim	25
cent.	Dplx...	motor	1250	16	Zenith.	grv...	d-d..	B-Lipe	selec...	B-Lipe.	motr..	4	worm.	Shel...		7.75	sprgs..	sprgs..	Shel...		int-r-w..	int-r-w	l...	Gem..	ctr..	mtl.	Spicer..	Vim	22
cent.	Dplx...	motor	1100	14	Zenith.	grv.	d-d..	B-Lipe	selec...	B-Lipe.	amid..	4	worm.	Shel...		7.75	sprgs..	sprgs..	Shel...		int-r-w..	int-r-w	l...	Gem..	ctr..	mtl.	Spicer..	Vim	23
cent.	Pierce..	motor	1600	16	Zenith.	grv...	d-d..	B-Lipe.	selec...	B-Lipe.	amid..	4	worm	Timkn.		8.50	sprgs.	sprgs..	S-P...		int-r-w..	int-r-w	l...	Ross..	ctr..	mtl.	Spicer..	Walker–Johnson	B
cent.	own...	motor	1200	15	Zenith.	grv...	cone..	own...	selec...	own...	motr..	4	ext-g..	own...		9.50	sprgs.	sprgs..	.....		ext-d-s.	ext-d-s	l...	own...	ctr..	fab..	own...	Walter.. Tractor M.O.	–35
cent.	Wau...	motor	1100	14	Stmbg.	grv...	d-d...	B-Lipe.	selec...	Warn..	amid..	4	d-rd...	own...		10.00	sprgs.	sprgs..	S-P...		ext-d-s.	ext-r-w	l..	Ross.	ctr..	fab..	M&E..	Walter	S
cent.	Wau...	motor	1000	16	Zenith.	grv...	d-d.	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Shel...		7.75	r-rd...	sprgs..	Merl..		int-r-w	int-r-w	l...	Ross.	ctr..	mtl.	Spicer..	Ward–La France	2B
cent.	Wau...	motor	900	14	Zenith.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Shel...		8.75	r-rd...	sprgs..	Merl..		int-r-w	int-r-w	l...	Ross.	ctr..	mtl.	Spicer..	Ward–La France	4A
cent.	Wau...	motor	900	12	Zenith.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Shel...		10.25	r-rd...	sprgs.	Merl..		int-r-w	int-r-w	l...	Ross.	ctr..	mtl.	Spicer..	Ward–La France	5A
cent.	Pierce..	motor	2000	16	Rayfld.	grv...	d-d...	B-Beck.	ind-c...	.....	jst...	3	bevl-4	own...		.....	t-arm.	t-arm.	.....		ext-d-s.	ext-r-w	r...	.....	.....	.....	.....	Ware	A–3½
cent.	Pierce..	motor	1100	11	Stmbg.	grv...	d-d.	B-Lipe	selec...	B-Lipe	amid..	4	worm.	Timkn.		8.75	sprgs.	sprgs..	Shel...		int-r-w	int-r-w	l..	Gem..	ctr..	mtl*	Spicer..	Watson	3½
none.	none...	none..	1400	.....	own...	grv...	w-p...	own...	selec...	own...	amid..	4	bevel..	own...		.....	r-rd...	sprgs.	.....		ext-r-w.	int-r-w	l...	own...	ctr..	mtl..	own...	White	15
none.	none...	none..	1400	.....	own...	grv...	w-p...	own...	selec...	own...	amid..	4	d-rd...	own...		.....	r-rd..	sprgs.	.....		ext-r-w.	int-r-w	l...	own...	ctr..	mtl..	own...	White	30
cent.	own...	motor	1600	15	own...	vac...	w-p...	own...	selec...	own...	motr..	4	d-rd ..	own...		.....	r-rd ..	sprgs.	.....		ext-d-s.	int-r-w	l...	own...	ctr.	mtl..	own...	White	40
cent.	own...	motor	1600	15	own...	vac...	w-p...	own...	selec...	own...	motr..	4	d-rd...	own...		.....	r-rd...	sprgs.	.....		ext-d-s.	int-r-w	l...	own...	ctr.	mtl..	own...	White	45
.....	.....	.....	.....	.....	Stmbg.	.....	cone..	.....	.....	Covert.	.....	3	worm.	Shel...		.....	.....	.....	.....		.....	.....	.....	Ross.	.....	.....	own...	Wichita	L
.....	Wau...	.....	.....	.....	Stmbg.	.....	cone..	.....	.....	Covert.	.....	3	worm.	Shel...		.....	.....	.....	.....		.....	.....	.....	Ross.	.....	.....	own...	Wichita	M
.....	Wau...	.....	.....	.....	Stmbg.	.....	cone..	.....	.....	Covert.	.....	3	worm	Shel...		.....	.....	.....	.....		.....	.....	.....	Ross.	.....	.....	own...	Wichita	R
.....	Wau...	.....	.....	.....	Stmbg.	.....	cone..	.....	.....	B-Lipe.	.....	4	worm.	Shel...		.....	.....	.....	.....		.....	.....	.....	Ross.	.....	.....	own...	Wichita	O
.....	Dplx...	.....	.....	.....	Stmbg.	.....	cone.	.....	.....	own..	.....	4	d-rd...	own...		.....	.....	.....	.....		.....	.....	.....	Ross.	.....	.....	own...	Wichita	S
cent.	Pierce..	motor	1100	18	Stmbg.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	3	worm.	Wis....		7.75	sprgs..	sprgs..	Shel*		int-r-w	int-r-w	l...	Gem..	ctr..	mtl..	Spicer..	Wilcox	A–1
cent.	Pierce..	motor	1100	14	Wil-B..	grv.	cone..	own...	selec...	own...	amid..	4	worm.	Wis....		8.25	sprgs.	sprgs.	Shel*		int-r-w	int-r-w	l...	own...	ctr..	mtl*	Hart*.	Wilcox	B
cent.	Pierce..	motor	1100	13	Wil-B.	grv.	cone.	own...	selec...	own...	amid..	4	worm.	Wis....		8.60	sprgs.	sprgs.	Shel*		int-r-w	int-r-w	l...	own...	ctr..	mtl*	Hart*.	Wilcox	C
cent.	Pierce..	motor	1100	12	Wil-B.	grv.	cone.	own...	selec...	own...	amid..	4	worm.	Shel...		11.75	r-rd...	sprgs.	Shel...		int-r-w	int-r-w	l...	own...	ctr..	mtl*	Hart*.	Wilcox	E
cent.	Wau.	motor	1000	12	Wil-B.	grv.	cone.	own...	selec...	own...	amid..	4	worm.	Shel...		10.25	r-rd...	sprgs.	Shel...		int-r-w	int-r-w	l...	own...	ctr..	mtl.	Hart*.	Wilcox	W
cent.	Pierce..	motor	1100	17	Marvl.	grv.	d-d...	B-Beck.	selec...	B-Lipe	amid..	4	worm.	Timkn.		6.00	sprgs.	sprgs.	S-P...		int-r-w	int-r-w	l...	Ross.	ctr..	mtl*	Hart*.	Wilson	F
cent.	Pierce..	motor	1150	15	Marvl.	grv.	d-d...	B-Beck.	selec.	B-Lipe	amid..	4	worm	Timkn.		7.75	sprgs.	sprgs.	S-P...		int-r-w	int-r-w	l...	Ross.	ctr..	mtl*	Hart*.	Wilson	EA
cent.	Pierce..	motor	1150	14	Marvl.	grv...	d-d...	B-Lipe	selec.	B-Beck.	amid..	4	worm	Timkn.		8.75	sprgs.	sprgs.	S-P...		int-r-w	int-r-w	l...	Ross.	ctr..	mtl*	Hart*.	Wilson	G
cent.	Pierce..	motor	1100	12	Marvl.	grv.	d-d...	B-Lipe.	selec.	B-B ck	amid..	4	worm.	Timkn.		10.25	sprgs.	sprgs.	S-P..		int-r-w	int-r-w	l...	Ross.	ctr..	mtl*	Hart*.	Wilson	H
none.	none...	none..	1600	17	Stmbg.	grv.	d-d...	Fuller.	selec.	Fuller.	motr.	3	int-g-4	Ken...		9.00	sprgs.	sprgs.	Harv.		ext-d-s.	ext-d-s	l...	Lavn..	ctr..	mtl.	Arvac..	Winther–Marwin	430–A
none.	none...	none..	1500	16	Stmbg.	grv.	d-d...	Fuller.	selec.	Fuller.	motr.	3	int-g-4	Clrk...		10.50	sprgs.	sprgs.	Harv.		ext-r-w.	ext-d-s	l...	Lavn.	ctr..	mtl.	Arvac.	Winther–Marwin	459
none.	none...	none..	1400	15	Mast...	vac...	d-p...	B-Beck.	selec.	B-Lipe.	amid.	4	int-g-4	Clrk...		.....	sprgs.	sprgs.	Mth.		ext-r-w.	int-r-w	r...	Ross.	ctr..	mtl.	Blood..	Winther–Marwin	479
none.	none...	none..	1400	20	Stmbg.	grv.	d-d...	Fuller.	selec.	Fuller.	motr.	3	int-g..	Ken...		7.00	sprgs.	sprgs.	Harv.		ext-d-s.	ext-d-s	l...	Lavn.	ctr..	mtl.	Arvac.	Winther	39
none.	none...	none..	1400	18	Mast...	vac...	d-p...	B-Beck.	selec.	B-Lipe.	amid.	4	int-g..	Clrk...		8.13	sprgs.	sprgs.	Mth.		ext-r-w.	int-r-w	r...	Ross.	ctr..	mtl.	Blood..	Winther	49A
none.	none...	none..	1400	17	Mast...	vac...	d-p...	B-Beck.	selec.	B-Lipe.	amid.	4	int-g..	Clrk...		9.00	sprgs.	sprgs.	Mth.		ext-r-w.	int-r-w	r...	Ross.	ctr..	mtl.	Blood..	Winther	69
none.	none...	none..	1400	25	Mast...	vac...	d-p...	B-Beck.	selec.	B-Lipe.	amid.	4	int-g..	Clrk...		7.00	sprgs.	sprgs.	Mth.		ext-r-w.	int-r-w	r...	Ross.	ctr..	mtl.	Blood..	Winther	979
cent.	Dplx...	motor	1295	14	Mast...	vac...	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	int-g..	Clrk...		.....	sprgs.	sprgs.	Mth.		int-r-w.	int-r-w	r...	Ross.	ctr..	mtl.	Blood..	Winther	89

See preceding pages for abbreviations.

Detailed Technical Specifications of

Name and Model	Tons Capacity	Chassis Price	Wheelbase, Inches	FRAME			TIRES			WHEELS		ENGINE														
								Size in Ins.							COOLING					IGNITION			ELEC. SYSTEM		
																Radiator									
																CASE		CORE							
				Make	Materia	Type	Kind	Front	Rear	Make	Type	Make	No. Cyl Bore and Stroke—N.A.C.C. Hp.	Cylinders Cast	Water Circ.	Make	Type	Make	Type	Type	Make	Spark Advance	Type	Make	Extra Cost $
Winther	109	5		162	own...	rol-c..	s-flex..	sol....	36x5	40x5d	Clrk..	mt....	Wsc...	4-4½x5½-36.2	2	cent...	own...	cst.....	Brem.	pln....	sing..	Eismn.	hand..	lghtg..	Bijur..	....
Winther	129	6		162	own...	rol-c..	s-flex..	sol....	36x6	40x6d	Clrk..	mt....	Wsc...	4-5½x6 -42.2	4	cent...	own...	cst.....	Brem.	pln....	sing..	Eismn.	hand.	lghtg..	Bijur..	....
Winther	149	7		162	own...	rol-c..	s-flex..	sol....	36x6	40x7d	Clrk..	mt....	Wsc...	4-5½x6 -42.2	2	cent...	own...	cst.....	Brem.	pln....	sing..	Eismn.	hand..	lghtg..	Bijur..	....
Witt-Will	N	1	2,000	120	Prsh..	p-stl..	flex...	sol....	36x3½	36x4	Arch..	wd....	Con...	4-3½x5 -22.5	4	cent...	Brem.	cst.....	Brem.	cel.....	sing..	Eismn.	auto..	none..	none..	none
Witt-Will	N. Special	1½	2,150	120	Prsh..	p-stl..	flex...	sol....	36x3½	36x5	Arch..	wd....	Con...	4-3½x5 -22.5	4	cent...	Brem.	cst.....	Brem.	cel.....	sing..	Eismn.	auto..	none..	none..	none
Witt-Will	P	2½	2,950	144	Prsh..	p-stl..	flex...	sol....	36x3½	36x7	Arch..	wd....	Con...	4-4½x5½-27.2	4	cent...	Mod..	cst.....	Mod..	cel.....	sing..	Eismn.	auto..	none..	none..	none
Wolverine	C	1½		140	P&B..	p-stl..	s-flex..	sol*...	34x3½	34x5	.....	wd....	Con...	4-3½x5 -22.5	4	ther...	Lng...	cst.....	Lng...	fin.....	sing..	Eismn.	hand..	sl&i-2.	G&D..	non.

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Name and Model	Tons Capacity	Chassis Price	Wheelbase, Inches	FRAME			TIRES			WHEELS		ENGINE														
								Size in Ins.							COOLING					IGNITION			ELEC. SYSTEM		
																Radiator									
																CASE		CORE							
				Make	Materia	Type	Kind	Front	Rear	Make	Type	Make	No. Cyl Bore and Stroke—N.A.C.C. Hp.	Cylinders Cast	Water Circ.	Make	Type	Make	Type	Type	Make	Spark Advance	Type	Make	Extra Cost $
Acme	F	1½	$2,275	141	Smith..	p-stl..	s-flex..	sol....	34x3½	34x5	Bim...	wd....	own...	4-3½x5 -22.5	4	ther...	G&O..	sht.....	G&O..	fin.....	sing..	Eismn	hand..	lghtg..	G&D..	35
Atco	IG-10	1	.....	132	own...	rol-c..	rigid..	pnu...	34x4½	36x6	Stn...	wd....	.....	4-3½x5½-22.5	4	cent...	Chgo.	cst.....	Chgo.	fin.....	sing..	.....	hand..	s,l&i..	West..	....
Beck	K	3½	3,700	160	P&B..	p-stl..	.....	sol....	36x5	36x5d	.....	wd....	Con...	4-4½x5½	.....	.....	.....	.....	.....	tub.....	.....	Bosch.	.....	.....	.....	....
Bethlehem	D	¾	1,495	125	Det...	p-stl..	.....	pnu...	34x4½	34x4½	Wyn..	wd....	own...	4-3½x5 -19.6	....	ther...	Liv...	sht.....	Liv...	cel.....	sing..	Bosch.	hand..	lghtg..	G&D..	....
Chevrolet		1	1,325	125	own...	rol-c..	.....	pnu...	33x4	35x5	own...	wd....	own...	4-3 1/8x5½	4	cent...	own...	p-stl...	own...	cel.....	sing..	A-L...	hand..	st&lg..	A-L...	....
Chevrolet		¾	.....	110	.....	.....	.....	pnu...	33x4	33x4	.....	wd....	own...	4-3 1/8x5½	4	cent...	own...	p-stl...	own...	cel.....	dual..	Remy.	hand..	st&lg..	.....	....
Columbia	H	1½	2,200	138	.....	ch-stl..	.....	sol....	34x3½	34x5	.....	.....	Hink..	4-3½x5½	.....	.....	.....	.....	.....	.....	.....	Bosch.	.....	.....	.....	....
Dart	H	1	2,100	130	Sav...	p-stl..	s-flex..	sol....	34x3½	34x5	Bim...	wd....	Buda..	4-3½x5½-22.5	4	ther...	own...	cast.....	S-J...	cel.....	sing..	Eismn	hand..	s-l*	.....	200
Dart	S	1½	2,250	140	Sav...	p-stl..	s-flex..	sol....	34x3½	34x6	Bim...	wd....	Buda..	4-3½x5½-22.5	4	ther...	own...	cast.....	S-J...	cel.....	sing..	Eismn	hand..	s-l*	.....	200
Dart	M	2½	3,000	150	Sav...	p-stl..	s-flex..	sol....	36x4	36x7	Bim...	wd....	Buda..	4-4½x5½-29.0	4	cent...	own...	cast.....	S-J...	cel.....	sing..	Eismn	hand..	s-l*	.....	200
Dart	W	3½	4,000	160	Sav...	ro-st..	rigid..	sol....	36x5	36x10	Bim...	wd....	Buda..	4-4½x6 -32.4	4	cent...	own...	cast.....	S-J...	cel.....	sing..	Eismn	hand..	s-l*	.....	200
Dearborn	48	2	2,390	148	own...	rol-st..	s-flex..	pnu*...	34x4½	34x7	.....	wd....	Buda..	4-3½x5½-22.5	4	ther...	Chgo.	cast.....	Chgo.	fin.....	sing..	Bosch.	hand..	.....	.....	....
Denby	27	4	4,150	170	Drt...	p-stl..	s-flex..	sol....	36x5	36x10	.....	mt....	Cont..	4-4½x5½-32.4	2	cent...	Lng...	cst.....	Lng...	pln.....	sing..	Eismn	hand..	.....	.....	....
Ded e		¾	.....	114	.....	.....	.....	pnu...	32x3½	32x3½	.....	wd....	own...	4-3½x4½	4	cent...	.....	.....	.....	cel.....	sing..	own...	hand..	st&lg..	N.E..	....
Douglas	D	1½	2,000	128	own...	rol-c..	.....	sol....	34x3½	34x5	own...	wd....	Buda..	4-4½x5½	4	cent...	own...	cast.....	.....	.....	sing..	Eismn	hand..	.....	.....	....
Famous	B12	1½	2,095	138	.....	p-stl..	.....	sol....	36x3½	36x5	.....	.....	Cont..	4-3½x5- 22.5	4	ther...	.....	cast.....	.....	tube....	"GS"	Eismn	hand..	.....	.....	....
Gramm-Bernstein	65	1½	.....	138	Hyd...	p-stl..	flex...	opt....	36x3½	36x5	Bim...	wd....	Cont..	4-3½x5	4	ther...	own...	cast.....	Lng...	fin.....	sing..	N.E..	hand..	st-l...	N.E..	....
Gramm-Bernstein	15	1½	.....	138	Hyd...	p-stl..	flex...	sol....	36x3½	36x5	Bim...	wd....	Cont..	4-3½x5 -22.5	4	ther...	own...	cast.....	Lng...	fin.....	sing..	N.E..	hand..	s-l	N.E..	....
Gramm-Bernstein	20	2	.....	144	Hyd...	p-stl..	flex...	sol....	36x4	36x7	Bim...	wd....	Cont..	4-4½x5½-27.2	4	cent...	own...	cast.....	Lng...	fin.....	sing..	N.E..	hand..	s-l	N.E..	....
Gramm-Bernstein	35	3½	.....	156	Hyd...	p-stl..	flex...	opt....	36x5	40x10	Sth...	mtl...	Hink..	4-4 x4½	4	cent...	own...	cast.....	Lng...	fin.....	dual..	Eismn	hand..	s-l-i..	N.E..	....
Gramm-Bernstein	50	5	.....	168	Hyd...	p-stl..	flex...	sol....	36x6	40x12	Sth...	mtl...	Cont..	4-4½x6	2	cent...	own...	cast.....	Lng...	fin.....	dual..	Eismn	hand..	l.....	N.E..	....
Independent	F	1-2	.....	140	.....	.....	.....	.....	36x3½	36x5	.....	.....	Cont..	4-3½x5 -22.5	....	cent...	.....	cast.....	.....	.....	.....	Eismn	.....	.....	.....	....
Jumbo	15	1½	2,595	144½	.....	p-stl..	s-flex..	sol....	36x3½	36x5	.....	wd....	Buda..	4-3½x5½-22.5	4	cent...	.....	cst.....	.....	pln.....	sing..	N-E..	hand..	s&l.....	.....	none
Jumbo	20	2	2,795	144½	.....	p-stl..	s-flex..	pnu...	35x5	38x7	.....	wd....	Buda..	4-3½x5½-22.5	4	cent...	.....	cst.....	.....	pln.....	sing..	N-E..	hand..	s&l.....	.....	none
Jumbo	25	2½	3,095	152½	.....	p-stl..	s-flex..	sol....	36x4	36x7	Day..	mt....	Buda..	4-4½x5½-29.0	4	cent...	.....	cst.....	.....	pln.....	sing..	Eismn	hand..	lghtg..	.....	none
Jumbo	30	3	3,590	152½	.....	p-stl..	s-flex..	pnu...	36x6	42x9	Clk...	mt....	Buda..	4-4½x5½-29.0	4	cent...	.....	cst.....	.....	pln.....	sing..	Eismn	hand..	lghtg..	.....	none
Jumbo	35	3½	4,300	165	.....	p-stl..	s-flex..	sol....	36x5	36x10	Day..	mt....	Buda..	4-4½x6 -32.4	4	cent...	.....	cst.....	.....	pln.....	sing..	Eismn	hand..	lghtg..	.....	none
Jumbo	40	4	4,875	165	.....	p-stl..	s-flex..	pnu...	38x7	44x10	Clk...	mt....	Buda..	4-4½x6 -32.4	4	cent...	.....	cst.....	.....	pln.....	sing..	Eismn	hand..	lghtg..	.....	none
Oneida	A9	1½	1,985	135	.....	p-stl..	.....	sol....	36x3½	36x5	Prud..	wd....	own...	4-3½x5½-22.5	....	cent...	own...	cast.....	Spix..	cel.....	.....	Bosch.	.....	stl.....	West..	....
Oneida	B9	1½	2,385	144	.....	p-stl..	.....	sol....	36x3½	36x6	Prud..	wd....	own...	4-4 x5½-25.6	....	cent...	own...	cast.....	Spix..	cel.....	.....	Bosch.	.....	stl.....	West..	....
Oneida	C9	2½	2,900	160	.....	p-stl..	.....	sol....	36x4	36x7	Prud..	wd....	own...	4-4 x5½-25.6	....	cent...	own...	cast.....	Spix..	cel.....	.....	Bosch.	.....	stl.....	West..	....
Oneida	D9	3½	3,800	170	.....	p-stl..	.....	sol....	36x5	36x5d	Sth...	mtl...	own...	4-4½x5½-32.4	....	cent...	own...	cast.....	Spix..	cel.....	.....	Bosch.	.....	stl.....	West..	....
Oneida	E9	5	4,850	180	.....	p-stl..	.....	sol....	36x6	40x12	Sth...	mtl...	own...	4-4½x5½-32.4	....	cent...	own...	cast.....	Spix..	cel.....	.....	Bosch.	.....	stl.....	West..	....
Patriot	Lincoln	1½	.....	140	Det...	p-stl..	rigid..	sol*...	34x3½	34x5	Bim...	wd....	Hink..	4-4 x5½	4	cent...	own...	cast.....	Brem..	fin.....	sing..	Spltf..	hand..	.....	.....	....
Patriot	Washington	2½	.....	156	Det...	p-stl..	rigid..	sol*...	36x4	36x7	Bim...	wd....	Hink..	4-4½x5½	4	cent...	own...	cast.....	Brem..	fin.....	sing..	Spltf..	hand..	.....	.....	....
Reynolds		1½	2,650	140	own...	ch-st..	flex...	sol....	36x3½	36x6	Sth...	mtl...	own...	4-4 x5½	2	cent...	own...	cast.....	own...	fin.....	sing..	Eismn	hand..	st&lg..	.....	....
Reynolds		2½	3,350	152	own...	ch-st..	flex...	sol....	36x4	36x8	Sth...	mtl...	own...	4-4½x5½	2	cent...	own...	cast.....	own...	fin.....	sing..	Eismn	hand..	st&lg..	.....	....
Reynolds		3½	4,350	165	own...	ch-st..	flex...	sol....	36x5	36x5	Sth...	mtl...	own...	4-4½x5½	2	cent...	own...	cast.....	own...	fin.....	sing..	Eismn	hand..	st&lg..	.....	....
Reynolds		5	5,350	165	own...	ch-st..	flex...	sol....	36x6	36x6d	Sth...	mtl...	own...	4-4½x5½	2	cent...	own...	cast.....	own...	fin.....	sing..	Eismn	hand..	st&lg..	.....	....
Service	71	3½	4,085	171	own...	p-stl..	flex...	sol....	36x5	36x5d	Bim...	wd....	Buda..	4-4½x5½-29.0	4	cent...	Lng...	cst.....	Lng...	fin.....	sing..	Eismn	hand..	st&lg2	West..	....
Triangle	AA	¾	1,550	115	Mas...	rol-c..	s-flex..	pnu...	35x5	35x5	Hay..	wd....	H-S..	4-3½x5 -16.5	4	th-s...	Perf...	p-stl....	Perf...	tube....	sing..	Eismn	fixed..	st&lg..	N-E..	....
Triangle	C	2	2,585	147	Mas...	rol-c..	s-flex..	sol....	36x4	36x6	Royer.	wd....	Wav..	4-3½x5½-22.5	2	cent...	Perf...	p-stl....	Perf...	tube....	sing..	Eismn	fixed..	.....	.....	....
Watson		¾	1,750	128	Prsh..	p-stl..	rigid..	pnu...	34x4½	34x4½	.....	wd....	Wau..	4-3½x5½-22.5	4	cent..	G&O..	prs.....	G&O.	zz-t....	sing..	Dneto	hand..	sl&i-2.	Dneto	none
Wolverine	D	2	.....	140	Pnb...	p-stl..	s-flex..	sol*...	34x4	34x3½d	.....	wd....	Cont..	4-3½x5 -22.5	4	ther...	Lng...	cst.....	Lng...	fin.....	sing..	Eismn	hand..	sl&i-2.	G&D..	....

Steam Trucks

Name and Model	Capacity in Pounds	Price of Chassis	Wheelbase in Inches	FRAME		TIRES			Wheels	BOILER						WATER		
							SIZE IN INCHES							BURNER		PRESSURE			CONDENSER	
				Material	Construction	Kind	Front	Rear		Location	Type	Heating Surface in Sq. In.	Horsepower	Type	Regulation	Normal in Lbs.	Maximum in Lbs.	Water Capacity in Gal.	Type	Circulation
Steam-O-Truck	10,000	5,000	157	I-beam	.....	solid...	36x6	40x6d	-st	nder hood	Wat-tube	.....	40	atomiz..	auto....	.....	600	40	flat....	natural

See preceding pages for abbreviations.

Gasoline Motor Trucks for 1920—Cont.

ENGINE												TRANSMISSION										BRAKES		CONTROL			UNIVERSALS		
GOVERNOR			SPEED		FUEL SYS.		CLUTCH		GEARSET				FINAL DRIVE											STEERING GEAR					
Type	Make	Drive	Motor in r.p.m.	Truck in m.p.h.	Carbureter Make	Fuel Feed	Type	Make	Type	Make	Placed	Speeds	Type	Rear Axle Make	Total Gear Reduction	Propulsion Taken By	Torque Taken By	Springs Make	Foot	Hand	Placed	Make	Levers	Type	Make	Name and Model
cent.	Dplx...	motor	1100	12	Mast...	vac...	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	int-g..	Clrk...	.....	sprgs..	sprgs..	Mth.	int-r-w..	int-r-w..	r.....	Ross..	ctr.	mtl	Blood..	Winther.....109
cent.	Dplx...	motor	1016	11	Mast...	vac...	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	int-g..	Clrk...	.....	sprgs..	sprgs..	Mth.	int-r-w..	int-r-w..	r.....	Ross..	ctr..	mtl.	Blood..	Winther.....129
cent.	Dplx...	motor	925	10	Mast...	vac...	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	int-g..	Clrk...	.....	sprgs..	sprgs..	Mth.	int-r-w..	int-r-w..	r.....	Ross..	ctr..	mtl.	Blood..	Winther.....149
cent.	Pierce..	motor	1500	30	Zenith.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	3	worm.	Timkn.	6.75	sprgs..	sprgs..	Del...	int-r-w..	int-r-w	l.....	Ross..	l....	mtl..	Spicer..	Witt-Will.....N
cent.	Pierce..	motor	1500	30	Zenith.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	3	worm.	Timkn.	6.75	sprgs..	sprgs..	Del...	int-r-w..	int-r-w	l.....	Ross..	l....	mtl..	Spicer..	Witt-Will.....N. Special
cent.	Pierce..	motor	1500	25	Zenith.	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	3	worm.	Timkn.	7.75	sprgs..	sprgs..	Del...	int-r-w..	int-r-w	l.....	Ross..	l....	mtl..	Spicer..	Witt-Will.....P
suct..	Mnrch.	motor	1350	17	Stmbg.	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	int-g..	Russl..	7.70	sprgs..	.....	Tuth..	ext-r-w..	int-r-w	l.....	Gem..	ctr.	mtl	Univ..	Wolverine.....C

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cent	Dplx...	gearst.	1700	19½	Rayfld.	vac...	d-p...	B-Beck.	ind-c...	Cotta..	motr..	3	worm.	Timkn.	8.75	sprgs..	sprgs..	Dtr...	int-r-w..	int-r-w..	l....	Ross..	ctr..	mtl..	Blood..	Acme.....F
none.	.....	.....	.....	.....	Stmbg	vac...	d-d...	Fuller..	selec...	Fuller..	motr..	3	int-g..	Torbn..	7.00	sprgs..	sprgs..	Shel...	ext-r-w..	int-r-w..	l....	Ross..	ctr..	mtl..	Hart...	Atco.....IG-10
.....	.....	.....	.....	.....	Stmbg	.....	d-d	.....	selec...	.....	motr..	.....	.....	Shel...	.....	.....	.....	.....	ext-r-w..	int-r-w..	....	Lavn.	.....	.....	.....	Beck.....D
.....	.....	.....	1480	25	Stmbg	grv...	d-p...	B&B...	selec...	Det....	motr..	3	s-b...	Stan...	6.00	sprgs..	sprgs..	Math.	ext-r-w..	int-r-w..	l....	Ross..	ctr..	mtl..	Spicer.	Bethlehem.....K
yes..	.....	.....	.....	26	Zenith	grv...	cone..	own....	selec...	own....	motr..	3	worm.	own....	.....	.....	.....	.....	int-r-w..	int-r-w..	l....	own...	ctr.	fab..	own....	Chevrolet.....
none	none..	.....	.....	.....	Zenith	vac...	cone..	own....	selec...	own....	motr..	3	s-b...	own....	.....	.....	.....	.....	ext-r-w..	int-r-w..	l....	own...	ctr.	fab..	own....	Chevrolet.....
.....	Hink...	.....	.....	16	Stmbg	vac...	d-d...	Det....	selec...	Cov....	.....	.....	int-g..	Russ...	.....	.....	.....	.....	.....	.....	....	.....	.....	.....	Spicer.	Columbia.....H
.....	.....	.....	.....	25	Zenith	vac...	d-d...	Fuller..	selec...	Fuller..	motr..	3	worm.	own....	7.00	sprgs..	sprgs..	Stan..	int-t....	int-r-w..	l....	Ross..	ctr..	mtl..	Spicer..	Dart.....H
.....	.....	.....	.....	20	Zenith	vac...	d-d...	Fuller..	selec...	Fuller..	motr..	3	worm.	own....	7.00	sprgs..	sprgs..	Stan..	int-t....	int-r-w..	l....	Ross..	ctr..	mtl.	Spicer.	Dart.....S
cent	Pierce..	motr..	1200	18	Zenith	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	4	worm.	own....	8.50	sprgs..	sprgs..	Stan..	int-t....	int-r-w..	l....	Ross..	ctr..	mtl.	Spicer.	Dart.....M
cent	Pierce.	motr..	1200	10	Zenith	grv...	d-d...	Fuller..	selec...	Fuller..	amid..	4	worm.	own....	10.30	sprgs..	sprgs..	Stan..	int-r-w..	int-r-w..	l....	Ross..	ctr..	mtl.	Spicer.	Dart.....W
cent	Simp...	motr..	1300	18	Stmbg	vac...	d-d...	Fuller..	selec...	Fuller..	motr..	3	worm.	Chic...	9.25	sprgs..	sprgs..	Dtr...	int-r-w..	int-r-w..	l....	Detw.	ctr..	mtl..	Hart...	Dearborn.....48
cent	Simp...	motr..	1050	12	Stmbg	grv...	d-d...	own....	selec...	Warn..	amid..	4	int-g..	Clrk...	10.00	sprgs..	sprgs..	Dtr...	ext-r-w..	int-r-w..	l....	Ross..	ctr..	mtl..	Peters.	Denby.....27
none.	none...	.....	.....	.....	Stew...	vac...	d-d...	own....	selec...	own....	motr..	3	s-b...	own....	4.10	sprgs.	t-t.....	.....	ext-r-w..	int-r-w..	l....	own...	ctr..	.....	.....	Dodge.....
cent	Pierce..	motr..	1600	16	Schblr..	vac...	d-d...	Fuller..	selec...	Fuller..	motr..	3	int-g..	Torbn..	.....	sprgs..	sprgs..	own..	int-r-w..	int-r-w..	l....	Ross..	....	mtl..	Arvac..	Douglas.....D
suct..	Mnrch.	motr..	.....	....	Stmbg	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	int-g..	Clrk...	7.00	sprgs..	sprgs..	.....	ext-d-s..	ext-r-w..	l....	Ross..	ctr..	mtl..	.....	Famous.....B12
.....	.....	.....	1500	22	Stmbg	grv...	d-d...	Fuller..	ind-c...	Fuller..	amid..	3	worm.	Stan...	.....	sprgs..	sprgs..	Stan..	int-r-w..	int-r-w..	l....	Ross..	ctr..	fab..	Snead..	Gramm-Bernstein....65
.....	.....	.....	.....	.....	Stmbg	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	int-g..	Clrk...	.....	sprgs..	sprgs..	Stan..	ext-r-w..	int-r-w..	l....	Ross..	ctr..	fab..	Snead..	Gramm-Bernstein....15
cent	Pierce.	motr..	1350	18.6	Stmbg	grv...	d-d...	Fuller..	ind-c...	own....	amid..	4	worm.	Shel...	.....	sprgs..	sprgs..	Stan.	int-r-w..	int-r-w..	l....	Ross..	ctr..	fab..	own....	Gramm-Bernstein....20
cent	Hink...	motr..	1200	16.5	Stmbg	vac...	d-d...	own....	ind-c...	own....	amid..	4	worm	Stan...	.....	sprgs.	sprgs..	Stan..	int-r-w..	int-r-w..	l....	Ross..	ctr..	fab..	own....	Gramm-Bernstein....35
.....	Cont...	motr..	.....	....	Stmbg	vac...	d-d...	own....	ind-c...	own....	amid..	4	worm	Stan...	.....	sprgs.	sprgs..	Stan..	int-r-w..	int-r-w..	l....	Ross..	ctr..	fab..	own....	Gramm-Bernstein....50
cent	Pierce	.....	.....	....	Schblr..	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	worm	Wis...	8.25	.....	.....	.....	.....	.....	.....	Ross.	.....	.....	Sterl...	Independent.....F
none.	none...	.....	1500	....	Zenith	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	int-g..	Clrk...	1.10	sprgs..	sprgs..	S-P...	.....	.....	l....	Jacox.	ctr..	.....	Arvac..	Jumbo.....15
none	none...	.....	1500	....	Zenith	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	int-g..	Clrk...	1.10	sprgs..	sprgs..	S-P...	.....	.....	l....	Jacox.	ctr..	.....	Arvac..	Jumbo.....20
.....	Dplx...	.....	1250	....	Zenith	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	4	int-g..	Clrk...	1.10	sprgs..	sprgs..	Dtr...	.....	.....	l....	Jacox.	ctr..	.....	Arvac..	Jumbo.....25
.....	Dplx...	.....	1250	....	Zenith	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	4	int-g..	Clrk...	1.10	sprgs..	sprgs..	Dtr...	.....	.....	l....	Jacox.	ctr..	.....	Arvac..	Jumbo.....30
.....	Simp...	.....	1000	....	Zenith	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	4	int-g..	Clrk...	1.10	sprgs..	sprgs..	S-P...	.....	.....	l....	Jacox.	ctr..	.....	Arvac..	Jumbo.....35
.....	Simp...	.....	1000	....	Zenith	grv...	d-d...	B-Lipe.	selec...	B-Lipe.	motr..	4	int-g..	Clrk...	1.10	sprgs..	sprgs..	S-P...	.....	.....	l....	Jacox.	ctr..	.....	Arvac..	Jumbo.....40
.....	own...	motr..	1480	20	Stmbg	vac...	d-d...	own....	selec...	own....	amid..	3	worm	own....	.....	.....	.....	own..	.....	.....	.....	Ross.	.....	.....	Spicer.	Oneida.....A9
.....	own...	motr..	1500	17	Stmbg	vac...	d-d...	own....	selec...	own....	amid..	3	worm	own....	.....	.....	.....	own..	.....	.....	.....	Ross.	.....	.....	Spicer.	Oneida.....B9
.....	own...	motr..	1450	16	Stmbg	vac...	d-d...	own....	selec...	own....	amid..	4	worm	own....	.....	.....	.....	own..	.....	.....	.....	Ross.	.....	.....	Spicer.	Oneida.....C9
.....	own...	motr..	1450	14	Stmbg	vac...	d-d...	own....	selec...	own....	amid..	4	worm	own....	.....	.....	.....	own..	.....	.....	.....	Ross.	.....	.....	Spicer.	Oneida.....D9
.....	own...	motr..	1400	14	Stmbg	vac...	d-d...	own....	selec...	own....	amid..	4	worm	own....	.....	.....	.....	own..	.....	.....	.....	Ross.	.....	.....	Spicer.	Oneida.....E9
.....	.....	.....	.....	.....	Stmbg	vac...	d-d...	Covert.	selec...	Covert.	amid..	4	worm	Emp...	7.25	sprgs..	sprgs..	Coop.	int-r-w..	int-r-w..	l....	Ross..	r...	fab..	Sneed..	Patriot.....Lincoln
.....	.....	.....	.....	.....	.....	vac...	d-d...	Covert.	selec...	Covert.	amid..	4	worm	Emp...	10.60	sprgs..	sprgs..	Coop.	int-r-w..	int-r-w..	l....	Ross..	r...	fab..	Sneed..	Patriot.....Washington
cent.	Hink...	motr..	1400	....	Stmbg	grv...	d-d...	own....	selec...	own....	amid..	4	worm	own....	7.75	sprgs.	sprgs..	own..	int-r-w..	int-r-w..	l....	own ..	ctr..	f&m..	opt....	Reynolds.....
cent.	Hink...	motr..	1400	....	Stmbg.	grv...	d-p...	own....	selec...	own....	amid..	4	worm	own....	7.75	sprgs.	sprgs..	own..	int-r-w..	int-r-w..	l....	own...	ctr..	f&m..	opt....	Reynolds.....
cent.	Hink...	motr..	1400	....	Stmbg.	grv...	d-p...	own....	selec...	own....	amid..	4	worm	own....	8.10	sprgs.	sprgs..	own..	int-r-w..	int-r-w..	l....	own...	ctr..	f&m..	opt....	Reynolds.....
cent.	Hink...	motr..	1400	....	Stmbg	grv...	d-p...	own....	selec...	own....	amid..	4	worm	own....	10.20	sprgs.	sprgs..	own..	int-r-w..	int-r-w..	l....	own...	ctr..	f&m..	opt....	Reynolds.....
cent..	Simp...	motr..	1100	13	Stmbg..	grv...	d-p...	B&B...	selec...	B-Lipe.	amid..	4	worm.	Timkn.	8.75	r-rd...	sprgs..	Mth..	int.....	int.....	l....	Ross..	ctr..	mtl..	Spicer..	Service.....71
.....	.....	.....	.....	30	Stmbg.	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	int-g..	Clrk...	6.00	sprgs..	sprgs..	Det...	ext-d-s..	ext-r-w..	l....	Gim..	ctr..	mtl..	Unvsl..	Triangle.....AA
cent..	Wav...	.....	.....	18	Stmbg..	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	int-g..	Clrk...	8.00	sprgs..	sprgs..	Det...	ext-d-s..	ext-r-w..	l....	Gem..	ctr..	mtl..	Unvsl..	Triangle.....C
cent.	Wau.	motor	1400	35	John...	grv...	v-d...	B-Lipe.	selec...	B-Lipe.	motor.	3	worm.	own....	.....	sprgs..	sprgs..	Shel..	int-r-w..	int-r-w..	l....	Lavn..	ctr..	mtl..	M&E..	Watson.....
suct.	Mnrch.	motor	1350	17	Stmbg..	grv...	d-d...	Fuller..	selec...	Fuller..	motr..	3	int-g..	Russ...	.....	sprgs..	sprgs..	Tuth..	ext-r-w..	int-r-w..	l....	Gem .	ctr..	mtl..	Unvsl..	Wolverine.....D

Steam Trucks

SYSTEM			ENGINE						TRANSMISSION					CONTROL					
Feed Pump Type	Feed Control	Location	No. of Cylinders	Cylinders Cas	Valve Location	Valve Action	Valve Stroke	Reverses By	Final Drive	Gear Ratio	Axle Type	Propulsion Taken By	Torque Taken By	Throttle	Hook-up	Reverse	Steering Wheel Location	Brake Lever Location	Name and Model
none....	auto...	rear axle..	4	2	cyl-ends	Stokesbary	adjust-able..	lever.....	d-rd....	5.00-1	s-fltng	springs....	.....	lever.....	.....	.....	ight*....	center....	Steam-O-Truck..

See preceding pages for abbreviations.

Technical Specifications of 22 Electric

Name and Model	Load Capacity in Pounds	PRICE OF CHASSIS		Wheel-Base in Inches	TIRES			Location	BATTERY					MILES PER CHARGE		MOTOR	
		With Battery	Without Battery		Kind	SIZES IN INCHES			Make and Type	No. Plates	No. Cells	No. Trays	Amp.-Hr. Capacity	Light	Loaded	Location and Number	Make
						Front	Rear										
Atlantic....1-C	2,000			103	solid...	34x3½	36x4	amid-u....	Hycap*....	13*	44*	.....	165*	80	60	unit-j-l....	G. E.....
Atlantic....2-C	4,000			115	solid...	34x4	34x3d	amid-u....	Hycap*....	17*	44*	.....	220*	65	50	unit-j-l....	G. E.....
Atlantic....3-C	7,000			135	solid...	36x5	40x5d	amid-u....	Hycap*....	21*	44*	.....	275*	57	45	unit-j-l....	G. E.....
Atlantic....5-C	10,000			144	solid...	36x6	40x5d	amid-u....	Hycap*....	25*	44*	.....	330*	50	40	unit-j-l....	G. E.....
Atlantic....6-C	13,000			156	solid...	36x6	40x6d	amid-u....	Ironclad*....	25*	44*	.....	378*	45	35	unit-j-l....	G. E.....
C. T....¼-Ton	1,000		$1,900	89¼	solid...	36x3	36x3	amid-u....	C.T. Thin Lead*....	13*	42*	5*	153*	.....	60*	unit-x-2....	G. E.....
C. T....1-Ton	2,000		2,300	101	solid...	36x3½	36x4	amid-u....	C.T. Thin Lead*....	17*	42*	5*	204*	.....	60*	unit-x-2....	G. E.....
C. T....2-Ton	4,000		2,700	116	solid...	36x4	36x4d	amid-u....	C.T. Thin Lead*....	21*	42*	6*	255*	.....	55*	unit-x-2....	G. E.....
C. T....3½-Ton	7,000		3,900	122	solid...	36x6	36x4d	amid-u....	C.T. Thin Lead*....	27*	42*	6*	331*	.....	50*	unit-x-4*...	G. E.....
C. T....5-Ton	10,000		4,400	132	solid...	36x7	36x5d	amid-u....	C.T. Thin Lead*....	31*	42*	9*	382*	.....	50*	unit-x*-4...	G. E.....
Couple-Gear....H	7,000		4,750	.....	solid...	36x3½	36x4d	amid-u....	optional.....	.....	.....	.....	.....	.....	.....	in wheel-4..	own.....
Couple-Gear....A	10,000		5,250	.....	solid...	36x4	36x5d	amid-u	optional.....	.....	.....	.....	.....	.....	.....	in wheel-4..	own.....
Couple-Gear....LD	14,000		5,900	.....	solid...	36x5d	36x5d	amid-u....	optional.....	.....	.....	.....	.....	.....	.....	in wheel-4..	own.....
Lansden....M—1-Ton	2,000			106	solid...	36x3	36x3½	amid-u....	Edison*....	A-6	60	12	225	60	.....	unit-j-l....	G. E.....
Lansden....M—2-Ton	4,000			120	solid...	36x4	36x3d	amid-u....	Edison*....	A-8	60	12	300	50	.....	unit-j-l....	G. E.....
Lansden....M—3½-Ton	7,000			130	solid...	36x5	36x4d	amid-u....	Edison*....	A-10	60	12	375	50	.....	unit-j-l....	G. E.....
Lansden....M—5-Ton	10,000			142	solid...	36x6	36x5d	amid-u....	Edison*....	A-12	60	12	450	50	.....	unit-j-l....	G. E.....
Walker....M	1,000			93	solid...	34x3	36x3½	amid-u....	Edison*....	.....	.....	.....	.....	.....	.....	unit-x-1....	West.....
Walker....K	2,000			96	solid...	34x3½	36x4	amid-u....	Edison*....	.....	.....	.....	.....	.....	.....	unit-x-1....	West.....
Walker....L	4,000			112	solid...	38x4	38x6	amid-u....	Edison*....	.....	.....	.....	.....	.....	.....	unit-x-1....	West.....
Walker....P	7,000			131	solid...	36x5	38x5d	amid-u....	Edison*....	.....	.....	.....	.....	.....	.....	unit-x-1....	West.....
Walker....N	10,000			141	solid...	36x6	38x6d	amid-u....	Edison*....	.....	.....	.....	.....	.....	.....	unit-x-1....	West.....

Industrial Trucks

Automatic—D Tractor....1	650	.....	.....	38	solid...	16x3	16x3½	front-o....	Edison-A-4*....	9*	20*	2*	150*	.....	.....	amid-1....	G. E.....
Automatic—T-2 Tractor..2	800	.....	.....	36¾	solid...	16x3½	16x3½	front-o....	Edison-A-6*....	13*	30*	4*	225*	.....	.....	in rear-1....	own.....
Automatic—M. T. Trac...1	850	.....	.....	38	solid...	16x3	16x3½	front-o....	Edison-A-4*....	9*	40*	4*	150*	.....	.....	amid.....	G. E.....
Automatic—M-S Trac....5	1,100	.....	.....	38	solid...	16x3½	16x3½	front-o....	Edison-A-6*....	13*	42*	6*	225*	.....	.....	amid-1....	own.....
Automatic—M-6 Tractor. 6	1,100	.....	.....	38	solid...	16x3½	16x3½	front-o....	Edison-A-6*....	13*	42*	6*	225*	.....	.....	amid-1....	own.....
Automatic—R Standard..1	2,000	.....	.....	36	solid...	16x3	16x3	amid-u....	Edison-A-4*....	9*	20*	4*	150*	.....	.....	in front-1....	own
Automatic—D Standard..1	4,000	.....	.....	38	solid...	16x3	16x3½	rear-o....	Edison-A-4*....	9*	20*	2*	150*	.....	.....	amid-1....	G. E.....
Automatic—H-5....5	4,000	.....	.....	40½	solid...	9x5	20x3½	rear-o....	Edison-A-6*....	13*	21*	3*	225*	.....	.....	in rear-1....	own.....
Automatic—L-Short T....2	4,000	.....	.....	42½	solid...	9x5	16x3½	rear-o....	Edison-A-6*....	13*	21*	.....	225*	.....	.....	in rear-1....	G. E.....
Automatic—H-4....4	4,000	.....	.....	44½	solid...	9x5	20x3½	rear-o....	Edison-A-6*....	13*	21*	3*	225*	.....	.....	in rear-1....	own.....
Automatic—L-6....6	4,000	.....	.....	44½	solid...	9x5	20x3½	rear-o....	Edison-A-6*....	13*	21*	3	225*	.....	.....	in rear-2....	own.....
Automatic—L-Standard..1	4,000	.....	.....	50½	solid...	9x5	16x3½	rear-o....	Edison-A-6*....	13*	21*	3*	225*	.....	.....	in rear-2....	G. E.....
Automatic—H-Standard..1	4,000	.....	.....	50½	solid...	9x5	16x3½	rear-o....	Edison-A-6*....	13*	24*	3*	225*	.....	.....	in rear-1....	G. E.....
Automatic—H-Short....2	4,000	.....	.....	50½	solid...	9x5	16x3½	rear-o....	Edison-A-6*....	13*	21*	.....	225*	.....	.....	in rear-1....	G. E.....
Automatic—E-Standard..1	4,000	.....	.....	52	solid...	16x3	16x3½	rear-o....	Edison-A-4*....	9*	36*	3*	150*	.....	.....	amid-1....	G. E.....
Automatic—G....1	4,000	.....	.....	52	solid...	16x3	16x3½	rear-o....	Edison-A-4*....	9*	36*	4*	150*	.....	.....	amid-1....	G. E.....
Automatic—L-5....5	4,000	.....	.....	54	solid...	9x5	20x3½	rear-o....	Edison-A-6*....	13*	21*	3*	225*	.....	.....	in rear-1....	own.....
Automatic—E-11....11	4,000	.....	.....	60	solid...	16x3½*	16x3½*	amid-u....	Edison-A-6*....	13*	21*	4*	225*	.....	.....	in front-1....	own.....
Automatic—E-12....12	4,000	.....	.....	60	solid...	16x3½*	16x3½*	amid-u....	Edison-A-6*....	13*	21*	4*	225*	.....	.....	in front-1....	own.....
Automatic—S-F-Bag.Tr..1	4,000	.....	.....	96	solid...	27x3½	27x3½	amid-u....	Edison-A-6*....	13*	21*	3*	225*	.....	.....	in rear-1....	own.....
Automatic—D-F-Bag. Tr..2	4,000	.....	.....	102	solid...	27x3½	27x3½	front-u....	Edison-A-6*....	13*	21*	3*	225*	.....	.....	in rear-1....	own.....
Buda....A-2	4,000	.....	.....	44½	solid...	16x3½	16x3½	amid-u....	Edison-A-6*....	.....	24*	4*	225*	70*	50*	in front-1....	Diehl.....
Buda....Tractor TW-2	8,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	unit-sf....	.....
Crescent....F	4,000	.....	$1,500	58	solid...	20x3½	20x3½	amid-u....	Edison*....	4*	36*	1*	150*	8*	6*	in front-1....	Diehl.....
Crescent....T	10,000	.....	1,500	40	solid...	16x3½	20x3½	rear-o....	Edison*....	6*	36*	1*	240*	.....	.....	in rear-1....	Diehl.....
Electromobile....A	3,000	.....	1,380	43	solid...	20x3½	20x3½	front-u....	Thin Exide*....	9*	15*	.....	112*	.....	21*	unit-j-l....	Wagner....
Electromobile....B	3,000	.....	1,400	52	solid...	20x3½	20x3½	front-u....	Thin Exide*....	9*	24*	.....	112*	.....	29*	unit-j-l....	Wagner....
Electromobile....C	4,000	.....	1,500	48	solid...	20x3½	20x3½	front-u....	Thin Exide*....	13*	12*	.....	168*	.....	25*	unit-j-l....	Wagner....
Electromobile....CS	4,000	.....	1,500	.....	solid...	20x3½	20x3½	front-u....	Thin Exide*....	17*	12*	.....	224*	.....	33*	unit-j-l....	Wagner....
Electromobile....D	4,000	.....	1,525	60½	solid...	20x3½	20x3½	front-u....	Thin Exide*....	11*	24*	.....	140*	.....	32*	unit-j-l....	Wagner....
Electromobile....DS	4,000	.....	1,575	60½	solid...	20x3½	20x3½	front-u....	Thin Exide*....	15*	24*	.....	168*	.....	39*	unit-j-l....	Wagner....
Electromobile....EN	12,000	.....	1,750	21½	solid...	20x3½	20x3½	rear-o....	Thin Exide*....	11*	20*	.....	140*	.....	35*	unit-j-l....	Wagner....
Electromobile....E or EJ	15,000	.....	1,600	30	solid...	20x3½	20x3½	rear-o....	Thin Exide*....	13*	24*	.....	168*	.....	42*	unit-j-l....	Wagner....
Electromobile...ES or EJS	20,000	.....	1,625	43	solid...	20x3½	20x3½	rear-o....	Thin Exide*....	21*	24*	.....	280*	.....	69*	unit-j-l....	Wagner....
Elwell-Parker....TA	300	.....	.....	.....	solid...	15x3½	20x3½	rear-o....	.....	.....	.....	.....	.....	.....	.....	unit-x-1....	own.....
Elwell-Parker....TH	400	.....	.....	.....	solid...	20x3½	20x5	rear-o....	Edison*....	13*	42*	6*	225*	.....	.....	unit-x-1....	own.....
Elwell-Parker....CF	3,500	.....	.....	.....	solid...	25x3½	22x3½	rear-o....	Edison*....	13*	21*	3*	225*	.....	.....	unit-x-2....	own.....
Elwell-Parker....UB	4,000	.....	.....	.....	solid...	22x3½	15x3½	u-hood....	Edison*....	13*	21*	3*	225*	.....	.....	in front-1....	own.....
Elwell-Parker....DG	4,000	.....	.....	.....	solid...	27½x3½	27½x3½	front-u....	Edison*....	13*	21*	3*	225*	.....	.....	unit-x-1....	own.....
Elwell-Parker....IY	4,000	.....	.....	.....	solid...	20x3½	20x3½	amid-u....	Edison*....	13*	21*	6*	225*	.....	.....	in front-1....	own.....
Elwell-Parker....EG	4,000	.....	.....	58	solid...	22x3½	10½x5	front-o....	Edison*....	13*	21*	3*	225*	.....	.....	unit-x-2....	own.....
Elwell-Parker....EH	4,000	.....	.....	58	solid...	22x3½	15x3	front-o....	Edison*....	13*	21*	3*	225*	.....	.....	unit-x-2....	own.....
Elwell-Parker....FC	4,000	.....	.....	.....	solid...	22x3½	10½x5	u-hood....	Edison*....	13*	21*	3*	225*	.....	.....	in front-1....	own.....
Elwell-Parker....SE	4,000	.....	.....	.....	solid...	27½x3½	27½x3½	front-o....	Edison*....	13*	21*	3*	225*	.....	.....	unit-x-1....	own.....
Elwell-Parker....IX	4,000	.....	.....	.....	sohd...	20x3½	20x3½	amid-u....	Edison*....	13*	21*	6*	225*	.....	.....	in front-1....	own.....
Elwell-Parker....IE	.....	.....	.....	.....	solid...	15x3½	15x3½	front-o....	Edison*....	.....	24*	9*	150*	.....	.....	unit-x-1....	own.....
Hunt....A-17 Crane	1,500	.....	.....	59	solid...	20x3½*	20x3½*	amid.....	Exide*....	15*	12*	.....	220*	25*	20*	a-plat-1....	G. E.....
Hunt....A-17 Truck	4,000	.....	.....	59	solid...	20x3½*	20x3½*	amid.....	Exide*....	15*	12*	.....	220*	25*	20*	in rear-1....	G. E.....
Hunt....TW-48	3,000	.....	.....	44	solid...	20x3½	20x4½	front-o....	Exide*....	11*	12*	2*	158*	15*	10*	in wheel-1..	C. G.....
Hunt....A-17	4,000	.....	.....	59	solid...	20x3½*	20x3½*	amid.....	Exide*....	15*	12*	.....	220*	25*	20*	in rear-1....	G. E.*....
Hunt....B-17	4,000	.....	.....	83	solid...	22x3½*	22x3½*	amid.....	Exide*....	15*	24*	.....	220*	20*	15*	in rear-1....	G. E.*....
Hunt....DF-60	4,000	.....	.....	52⅜	solid...	20x3½	10½x5	front-o....	Exide*....	15*	12*	.....	220*	25*	20*	in front-2....	C. G.....
Hunt....EP-60	4,000	.....	.....	55	solid...	20x3½	10½x5	front-o....	Exide*....	15*	12*	.....	220*	25*	20*	in front-2....	C. G.....
Hunt....J	20,000	.....	.....	42	solid...	20x3½*	20x3½*	amid-o....	Exide*....	15*	24*	.....	220*	20*	15*	in rear-1....	G. E.*....
Karry Lode....1	4,000	$1,295	.....	51	solid...	20x3½	20x3½	amid-u....	Exide Hycap*....	17*	12*	1*	220*	30*	.....	unit-x-1....	G. E.*....
Karry Lode....2	4,000	1,395	.....	57	solid...	20x3½	10½x5	front-o....	Exide Hycap*....	17*	12*	1*	220*	30*	.....	unit-x-1....	G. E.*....
Karry Lode....3	.....	.....	.....	40	solid...	20x3½	20x3½	rear-o	.....	.....	.....	.....	.....	.....	.....	unit-x-1....	G. E.*....

ABBREVIATIONS—Types of Construction and Parts Makers

*—with other options
amid—amidships
amid-o—amidships, over frame
amid-u—amidships, underslung below frame
a-plat—above platform
btw-seats—between seats
cent—center
d—dual
front-o—over frame at front
front-u—in front, under frame
Her-gear—Herringbone gears
l-plat—to left of platform
l-seat—to left of seat
lever-l—lever left
lever-r—lever right
l-vert—left vertical
pedal-l—pedal to left of operator
rad-rd—radius rods
rear-o—at rear, over frame

Motor Trucks Offered on the 1920 Market

MOTOR					CONTROLLER			DRIVE						SPRINGS		CONTROL		
			SPEED IN MILES PER HOUR			SPEEDS		GEARING										
Winding	Horse-power	Voltage	Light	Loaded	Location	Ahead	Reverse	First Reduction	Final Reduction	Total Gear-Ratio	Torque Taken By	Propul-sion Taken By		Front	Rear	Steer	Con-troller Lever	Name and Model
series...	3.3	60*	12	10	u-seat....	4	2	s-chain...	rol-chain	10.08–1	.....	rad-rd....		½-ell....	½-ell....	wheel-l...	l-seat....	Atlantic.....1-C
series...	4.5	60*	11	9	u-seat....	4	2	s-chain...	rol-chain	10.08–1	.....	rad-rd....		½-ell....	½-ell....	wheel-l...	l-seat....	Atlantic.....2-C
series...	5.7	60*	10	8	u-seat....	4	2	s-chain...	rol-chain	13.05–1	.....	rad-rd....		½-ell....	½-ell....	wheel-l...	l-seat....	Atlantic.....3-C
series...	7.1	60*	9	7	u-seat....	5	2	s-chain...	rol-chain	.....	.....	rad-rd....		½-ell....	½-ell....	wheel-l...	l-seat....	Atlantic.....5-C
series...	7.1	60*	8	6	u-seat....	5	2	s-chain...	rol-chain	15.60–1	.....	rad-rd....		½-ell....	½-ell....	wheel-l...	l-seat....	Atlantic.....6-C
series...	2.5	60*	14	13	st-col....	4	2	spur-gear	spur-gear	10.01–1	springs...	rad-rd....		½-ell....	½-ell....	wheel-l...	b-wheel...	C. T.....½-Ton
series...	3.5	60*	14	12	st-col....	4	2	spur-gear	spur-gear	11.50–1	springs...	rad-rd*...		½-ell....	½-ell....	wheel-l...	b-wheel...	C. T.....1-Ton
series...	5.5	60*	12	10	st-col....	4	2	spur-gear	spur-gear	12.14–1	springs...	rad-rd*...		½-ell....	½-ell....	wheel-l...	b-wheel...	C. T.....2-Ton
series...	7.	60*	11	9	st-col....	4	2	spur-gear	spur-gear	17.32–1	springs...	rad-rd*...		½-ell....	½-ell....	wheel-l...	b-wheel...	C. T.....3½-Ton
series...	7.	60*	10	8	st-col....	4	2	spur-gear	spur-gear	20.14–1	springs...	rad-rd*...		½-ell....	½-ell....	wheel-l...	b-wheel...	C. T.....5-Ton
series...	3.5	200	15	10	u-seat....	5	5	bevel.....	bevel....	25.00–1	tor-arm...	rad-rd....		½-ell....	½-ell....	wheel-r...	u-seat....	Couple-Gear.....H
series...	5.0	200	12	7	u-seat....	5	5	.....	.....	25.00–1	tor-arm...	rad-rd....		½-ell....	½-ell....	wheel-r...	u-seat....	Couple-Gear.....A
series...	5.5	200	12	7	u-seat....	5	5	.....	.....	25.00–1	tor-arm...	rard-d....		½-ell....	½-ell....	wheel-r...	u-seat....	Couple-Gear.....LD
series...	4.0*	60	12	10	in dash...	4	2	bevel.....	rol-chain	11.64–1	springs...	rad-rd....		½-ell....	½-ell....	wheel-l...	u-wheel...	Lansden.....M—1-Ton
series...	5.0*	60	11	9	in dash...	4	2	bevel.....	rol-chain	11.43–1	springs...	rad-rd....		½-ell....	½-ell....	wheel-l...	u-wheel...	Lansden.....M—2-Ton
series...	6.0*	60	10	8	in dash...	4	2	bevel....	rol-chain	13.01–1	springs...	rad-rd....		½-ell....	½-ell....	wheel-l...	u-wheel...	Lansden.....M—3½-Ton
series...	8.0*	60	9	7	in dash...	4	2	bevel.....	rol-chain	14.62–1	springs...	rad-rd....		½-ell....	½-ell....	wheel-l...	u-wheel...	Lansden.....M—5-Ton
series...	.....	60	16	14	u-seat....	5	5	direct....	spur-gear	16.88–1	springs...	springs...		½-ell....	½-ell....	wheel-l...	l-seat....	Walker.....M
series...	.....	60	14	12	u-seat....	5	5	direct....	spur-gear	16.88–1	springs...	springs...		½-ell....	½-ell....	wheel-l...	l-seat....	Walker.....K
series...	.....	60	12	10	u-seat....	5	5	direct....	spur-gear	16.14–1	springs...	springs...		½-ell....	½-ell....	wheel-l...	l-seat....	Walker.....L
series...	.....	60	12	9	u-seat....	5	5	direct....	spur-gear	15.59–1	springs...	springs...		½-ell....	½-ell....	wheel-l...	l-seat....	Walker.....P
series...	.....	60	11	8	u-seat....	5	5	direct....	spur-gear	18.16–1	springs...	springs...		½-ell....	½-ell....	wheel-l...	l-seat....	Walker.....N

Industrial Trucks

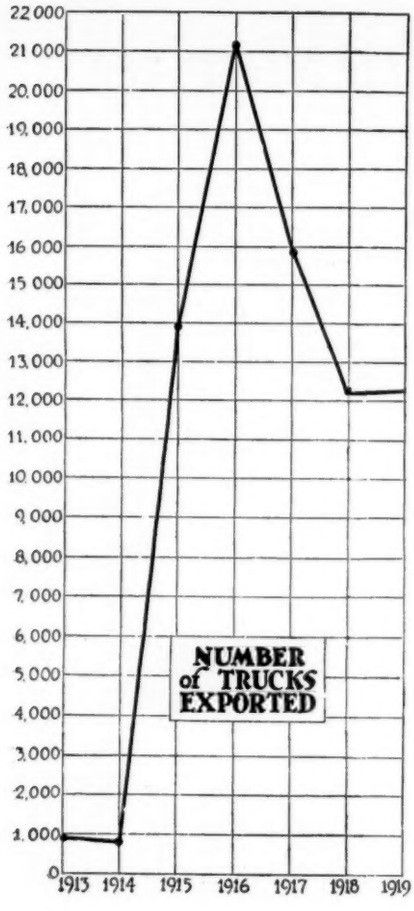
series...	2*	24	5½	4	in dash...	3	3	s-chain...	rol-chain	11.70–1	sub-fr....	sub-fr....	coil.....	coil.....	lever-r...	l-plat....	Automatic—D Tractor...1
series...	3.5	24	6	5	in dash...	3	3	worm....	worm....	17.50–1	sub-fr....	sub-fr....	coil.....	coil.....	lever-c...	.....	Automatic—T-2 Tractor.2
series...	2*	24	5½	4	l-seat....	3	3	s-chain...	rol-chain	15.30–1	sub-fr....	sub-fr....	coil.....	coil.....	wheel-c...	l-seat....	Automatic—M T.Tr....1
series...	3.5	48	7	5	u-wheel...	3	3	.....	worm....	17.50–1	sub-fr....	sub-fr....	coil.....	coil.....	wheel-c...	u-wheel...	Automatic—M-S Trac...S
series...	3.5	48	7	5	amid.....	3	3	.....	worm....	17.50–1	sub-fr....	sub-fr....	coil.....	coil.....	wheel-c...	u-wheel...	Automatic—M-6 Trac...6
series...	2*	24	6	5	in dash...	2	2	.....	worm & bl.	16.00–1	sub-fr....	sub-fr....	coil.....	coil.....	lever-r...	l-plat....	Automatic—R-Std 1
series...	2*	24	5½	4	in dash...	3	3	s-chain...	rol-chain	11.70–1	sub-fr....	sub-fr....	coil.....	coil.....	lever-r...	l-plat....	Automatic—D-Std.....1
series...	3.5	24	6	5	in dash...	3	3	.....	worm....	17.50–1	sub-fr....	sub-fr....	coil.....	coil.....	lever-l...	r-plat....	Automatic—H-5.....5
series...	2*	24	6	5	in dash...	3	3	spur gear	spur gear	9.90–1	sub-fr....	sub-fr....	.....	.....	lever-l...	r-plat....	Automatic—L Short....2
series...	3.5	24	6	5	in dash...	3	3	.....	worm....	17.50–1	sub-fr....	sub-fr....	.....	coil.....	lever-l...	r-plat....	Automatic—H-4.....4
series...	3.5	24	6	5	in dash...	3	3	.....	worm....	17.50–1	sub-fr....	sub-fr....	.....	coil.....	lever-l...	r-plat....	Automatic—L-6.....6
series...	2*	24	6	5	in dash...	3	3	spur gear	spur gear	9.90–1	sub-fr....	sub-fr....	.....	.....	lever-l...	r-plat....	Automatic—L Standard..1
series...	2*	24	6	5	in dash...	3	3	spur gear	spur gear	9.90–1	sub-fr....	sub-fr....	.....	.....	lever-l...	r-plat....	Automatic—HStandard..1
series...	2*	24	6	5	in dash...	3	3	spur gear	spur gear	9.90–1	sub-fr....	sub-fr....	.....	.....	lever-l...	r-plat....	Automatic—HShort.....2
series...	2*	24	8	6	in dash...	3	3	s-chain...	rol-chain	15.30–1	sub-fr....	sub-fr....	coil.....	coil.....	lever-r...	l-plat....	Automatic—E Standard..1
series...	2*	24	8	6	in dash...	3	3	s-chain...	rol-chain	11.70–1	sub-fr....	sub-fr....	coil.....	coil.....	lever-r...	l-plat....	Automatic—G.....1
series...	3.5	24	6	5	in dash...	3	3	.....	worm....	17.50–1	sub-fr....	sub-fr....	.....	coil.....	lever-l...	r-plat....	Automatic—L-5.....5
series...	3.5	24	6	5	in dash...	3	3	.....	worm....	17.50–1	sub-fr....	sub-fr....	coil.....	coil.....	lever-r...	l-plat....	Automatic—E-11.....11
series...	3.5	24	6	5	in dash...	3	3	.....	worm....	17.50–1	sub-fr....	sub-fr....	coil.....	coil.....	lever-r...	l-plat....	Automatic—E-12.....12
series...	3.5	24	6	5	u-plat....	3	3	.....	worm....	17.50–1	sub-fr....	sub-fr....	coil.....	coil.....	lever-l...	r-plat....	Automatic—S.F.Bag.Tr.1
series...	3.5	24	6	5	u-plat....	3	3	.....	worm....	17.50–1	sub-fr....	sub-fr....	coil.....	coil.....	lever-l...	r-plat....	Automatic—D.F.Bag.T.2
series...	1.2	24	7	7	u-plat....	3	3	worm....	.....	11.66–1	tor-arm...	tor-arm...	coil.....	coil.....	lever-r...	left.....	Buda.....A-2
																	Buda.....T-Tractor W-2
series...	1.5	36	8	6	u-plat....	3	3	spur gear	worm....	*9.00–1	tor-arm...	tor-arm...	.....	.....	lever-l...	l-plat....	Crescent.....F
series...	1.5	36	6	4*	u-seat....	3	3	spur gear	worm....	*12.00–1	.....	tor-arm...	.....	.....	lever.....	btw-seats	Crescent.....T
series...	1	30	.....	5	u-plat....	4	4	s-chain...	rol-chain	13.65–1	tor-arm...	rad-rd....	coil.....	coil.....	lever-r...	left.....	Electromobile.....A
series...	1	30	.....	5	u-plat....	4	4	s-chian...	rol-chain	13.65–1	tor-arm...	rad-rd....	coil.....	coil.....	lever-r...	left.....	Electromobile.....B
series...	1.5	30	.....	5	u-plat....	4	4	s-chain...	rol-chain	13.65–1	tor-arm...	rad-rd....	coil.....	coil.....	lever-r...	left.....	Electromobile.....C
series...	1.5	30	.....	5	u-plat....	4	4	s-chain...	rol-chain	13.65–1	tor-arm...	rad-rd....	coil.....	coil.....	lever-r...	left.....	Electromobile.....CS
series...	1.5	30	.....	7	u-plat....	4	4	s-chain...	rol-chain	13.65–1	tor-arm...	rad-rd....	coil.....	coil.....	lever-r...	left.....	Electromobile.....D
series...	1.5	30	.....	7	u-plat....	4	4	s-chain...	rol-chain	13.65–1	tor-arm...	rad-rd....	coil.....	coil.....	lever-r...	left.....	Electromobile.....DS
series...	1.5	30	10	8	u-plat....	4	4	s-chian...	rol-chain	13.65–1	tor-arm...	rad-rd....	coil.....	coil.....	lever-r...	left.....	Electromobile.....EN
series...	1.5	30	.....	7	u-plat....	4	4	s-chain...	rol-chain	13.65–1	tor-arm...	rad-rd....	coil.....	coil.....	lever-r...	left.....	Electromobile....E or EJ
series...	1.5	30	.....	7	u-plat....	4	4	s-chain...	rol-chain	13.65–1	tor-arm...	rad-rd....	coil.....	coil.....	lever-r...	left.....	Electromobile..ES or EJS
series...	.....	32	7½	.....	u-seat....	3	3	worm....	.....	.....	tor-arm...	tor-arm...	.....	.....	lever-l...	l-seat....	Elwell-Parker.....TA
series...	.....	.....	5½	.....	u-seat....	3	3	worm....	.....	.....	tor-arm...	tor-arm...	.....	.....	lever-l...	l-seat....	Elwell-Parker.....TH
series...	.....	24	.....	.....	in dash...	6	4	worm....	.....	.....	tor-arm...	tor-arm...	coil.....	coil.....	lever-l...	r-seat....	Elwell-Parker.....CF
series...	.....	.....	6	4	in dash...	3	3	worm....	.....	.....	.....	.....	.....	.....	lever-r...	l-seat....	Elwell-Parker.....UB
series...	.....	24	6	5	in dash...	3	3	worm....	worm....	.....	tor-arm...	tor-arm...	.....	.....	lever-r...	l-seat....	Elwell-Parker.....DG
series...	.....	.....	.....	.....	in dash...	3	3	worm....	.....	.....	tor-arm...	tor-arm...	.....	.....	lever-r...	.....	Elwell-Parker.....IY
series...	.....	24	5½	4	in dash...	3	3	worm....	.....	.....	tor-arm...	tor-arm...	.....	.....	lever-r...	left.....	Elwell-Parker.....EG
series...	.....	24	5½	4	in dash...	3	3	worm....	.....	.....	tor-arm...	tor-arm...	.....	.....	lever-r...	left.....	Elwell-Parker.....EH
series...	.....	.....	6	4	in dash...	3	3	worm....	.....	.....	.....	.....	.....	.....	lever-r...	l-seat....	Elwell-Parker.....FC
series...	.....	24	6	5	in dash...	3	3	worm....	worm....	.....	tor-arm...	tor-arm...	.....	.....	lever-r...	l-seat....	Elwell-Parker.....SE
series...	.....	.....	.....	.....	in dash...	3	3	worm....	.....	.....	tor-arm...	tor-arm...	.....	.....	lever-r...	.....	Elwell-Parker.....IX
series...	.....	24	6½	4½	in dash...	3	3	worm....	.....	.....	tor-arm...	tor-arm...	coil.....	coil.....	.....	right.....	Elwell-Parker.....IE
series...	½	24	6*	5*	u-plat....	3	3	worm....	worm....	.....	frame....	frame....	.....	.....	lever-r...	left.....	Hunt.....A-17 Crane
series...	2	24	6*	5*	u-plat....	3	3	spur gear	spur gear	.....	frame....	frame....	.....	.....	lever-r...	left.....	Hunt.....A-17 Truck
series...	2	24	5*	4*	in dash...	2	2	bevel....	bevel....	.....	frame....	frame....	.....	.....	lever-r...	left.....	Hunt.....TW-48
series...	2	24*	6*	5*	u-plat....	3	3	spur gear	spur gear	.....	frame....	frame....	.....	.....	lever-r...	left.....	Hunt.....A-17
series...	4	48*	6*	5*	u-plat	3	3	spur gear	spur gear	.....	frame....	frame....	.....	.....	lever-r...	left.....	Hunt.....B-17
series...	2	24*	6*	5*	in dash...	2	2	bevel.....	bevel.....	.....	frame....	frame....	.....	.....	lever-r...	left.....	Hunt.....DF-60
series...	2	24*	6*	5*	in dash...	2	2	bevel....	bevel....	.....	frame....	frame....	.....	.....	lever-r...	left.....	Hunt.....EP-60
series...	4	48*	6*	4*	u-seat....	3	3	spur gear	spur gear	.....	frame....	frame....	.....	.....	wheel-c...	r-seat....	Hunt.....J
series...	3	24	7	6	on dash..	3	3	bevel....	spur gear	13.00–1	.....	.....	.....	.....	lever-r...	l-plat....	Karry Lode.....1
series...	3	24	7	6	on dash..	3	3	bevel....	spur gear	13.00–1	.....	.....	.....	.....	lever-r...	l-plat....	Karry Lode.....2
series...	3	24	6	5	u-seat....	3	3	bevel....	spur gear	17.00–1	.....	.....	.....	.....	lever-l...	r-seat....	Karry Lode.....3

ABBREVIATIONS—Continued

r-seat—to right of seat
rol-chain—silent chain
st-col—on steering column
sub-fr—sub frame
tor-arm—torque arm
u-bat—under battery box
u-floor—under floor
u-hood—under hood
unit-j—unit jackhaft
unit-sf—unit with sub frame
unit-w—unit with wheel
unit-x—unit with axle
u-lever—under lever
u-plat—under platform
u-wheel—under steering wheel
u-seat—under seat
½-ell—½ elliptic
¾-ell—¾ elliptic
wheel-c—wheel in center
wheel-l—wheel on left
wheel-r—wheel on right
C-G—Couple-Gear
G. E.—General Electric
West—Westinghouse

Truck Exports for Satisfactory

Exports for 1919 show slight increase over preceding permanent market to replace temporary



TRUCK exports in 1919, with an increase of 42 over 1918, show a satisfactory balance when all factors are taken into consideration. During the three years previous to 1919 nearly half of our exported trucks went to England, while last year there was a drop of over four thousand in our truck exports to that country. This was a natural tendency as a result of the cessation of war demands in Britain, with the resulting surplus of trucks released from war work.

With this extremely large, though natural and inevitable, drop in truck exports to our largest customer, an increase in total exports of 42, though numerically small, indicates excellent progress in selling to other markets which are potentially permanent customers. The compensating gains have been made to some extent in South American countries, where substantial increase has occurred in all except Chile and Bolivia; 519 trucks were exported to South America during the past year, as against 416 for 1918 and 93 for 1916.

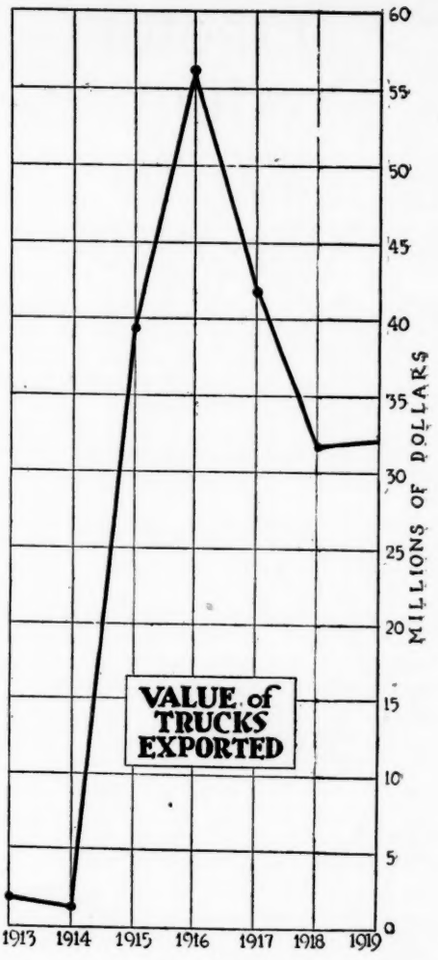
France shows a gain of over a thousand over 1918, though our exports to our sister republic did not come up to the high point reached in 1916. The other gains which make up for the great loss in exports to England are scattered throughout nearly every country on the globe. This fact indicates that our truck manufacturers are building their export trade on a firm foundation; that they are establishing relationships which are built on the basis of a broad, general market,

	1913	1914	1915	1916	1917	1918	1919	Total, All Years
Europe:								
Austria-Hungary	2 $3,595	3 $7,455	.....	.....	.....	.....	.....	5 $11,050
Azores and Madeira Isl.	.....	.....	.....	.....	.....	.....	.....	.....
Belgium	.....	.....	100 $365,000	.....	.....	.....	.....	100 $365,000
Bulgaria	2 $1,528	.....	.....	.....	.....	.....	.....	2 $1,528
Denmark	3 $2,120	.....	44 $25,033	41 $36,413	58 $81,414	2 $3,800	212 $38,876	360 $228,662
France	6 $10,709	2 $5,070	4,990 $13,523,843	5,681 $17,709,579	4,264 $13,854,903	2,754 $10,001,636	3,975 $16,440,603	21,772 $71,546,343
Germany	4 $4,029	24 $18,462	4 $2,800	.....	.....	.....	.....	32 $25,291
Gibraltar	.....	.....	.....	.....	.....	27 $58,325	.....	27 $58,325
Greece	1 $1,176	1 $1,800	142 $426,570	45 $93,815	3 $2,000	14 $32,000	25 $65,745	231 $627,106
Iceland and Faroe Isl.	.....	.....	.....	.....	.....	1 $2,245	7 $9,061	8 $11,306
Italy	.....	1 $1,229	1 $8,000	5 $14,655	65 $159,775	52 $28,055	27 $90,308	151 $302,022
Netherlands	2 $4,489	1 $1,452	9 $19,069	50 $93,797	36 $55,305	.....	15 $31,273	113 $205,385
Norway	2 $2,200	2 $3,852	3 $4,689	81 $121,480	162 $266,741	40 $133,227	449 $1,104,788	739 $1,626,977
Portugal	1 $1,400	8 $12,075	5 $10,291	295 $1,117,681	21 $45,087	12 $36,914	13 $48,358	355 $1,272,806
Roumania	12 $12,000	.....	.....	.....	.....	.....	45 $23,020	57 $35,020
Russia in Europe	13 $34,163	2 $5,322	2,251 $7,666,883	3,909 $12,544,258	1,733 $5,428,979	406 $1,562,303	.....	8,314 $27,241,908
Serbia, Montenegro & Albania	.....	.....	10 $6,300	20 $65,000	.....	.....	4 $5,700	34 $77,000
Spain	1 $1,400	.....	1 $1,800	30 $57,277	29 $55,808	46 $97,910	70 $132,522	177 $346,717
Sweden	.....	1 $900	10 $17,600	19 $29,050	6 $10,879	7 $10,369	44 $204,569	87 $173,358
Switzerland	.....	.....	.....	.....	.....	.....	.....	.....
Turkey in Europe	.....	1 $2,000	2 $8,009	.....	.....	.....	59 $97,305	62 $107,314
England	184 $119,468	203 $189,099	5,306 $14,042,325	8,268 $18,723,403	6,525 $17,061,105	4,805 $13,438,981	882 $2,565,559	26,173 $66,139,940
Scotland	.....	.....	4 $11,250	224 $271,745	.....	447 $1,203,328	.....	675 $1,386,323
Ireland	.....	.....	1 $7,033	8 $39,776	.....	.....	2 $4,276	11 $51,085
North America:								
British Honduras	.....	.....	.....	.....	.....	2 $3,700	1 $834	3 $4,534
Canada	489 $1,004,237	247 $474,724	306 $705,213	387 $724,817	636 $945,047	1,108 $1,381,542	1,473 $3,685,865	4,646 $8,921,445
Central American States:								
Costa Rica	2 $3,643	8 $10,571	2 $4,165	.....	1 $900	5 $10,245	1 $504	19 $30,028
Guatemala	.....	.....	.....	2 $4,916	4 $4,323	3 $5,512	4 $9,900	13 $24,551
Honduras	1 $3,000	.....	6 $12,500	6 $14,540	4 $4,094	6 $3,373	2 $1,100	25 $38,607
Nicaragua	.....	.....	.....	1 $2,500	.....	1 $2,509	7 $14,253	8 $16,762
Panama	.....	5 $7,243	6 $12,010	32 $55,171	75 $97,970	47 $47,859	41 $41,110	206 $261,363
Salvador	.....	.....	.....	1 $1,300	1 $868	4 $14,811	.....	6 $16,979
Mexico	35 $83,363	12 $17,509	8 $14,492	51 $100,500	218 $198,151	365 $525,664	614 $832,016	1,303 $1,771,695
Miquelon, Langley & St. Pierre Islands	.....	.....	.....	.....	.....	.....	4 $4,000	4 $4,000
Newfoundland & Labrador	4 $8,845	1 $1,221	1 $750	1 $1,692	1 $2,675	2 $7,250	9 $9,588	19 $32,021
West Indies, British:								
Barbados	.....	.....	.....	.....	1 $1,506	2 $3,400	15 $29,527	18 $34,433
Jamaica	4 $9,234	3 $9,250	3 $7,292	9 $18,524	6 $8,285	10 $6,775	20 $16,284	59 $75,644
Trinidad and Tobago	.....	1 $2,000	.....	2 $1,974	2 $5,722	14 $18,361	42 $35,827	61 $63,884
Other British	.....	.....	.....	6 $11,327	1 $500	28 $89,914	19 $12,010	54 $113,751
Cuba	14 $23,639	12 $33,500	21 $34,607	117 $176,647	397 $722,519	554 $1,130,932	680 $1,407,102	1,802 $3,528,996
Danish (Virgin Isl. of U. S.)	1 $4,250	.....	.....	.....	.....	2 $2,845	1 $3,350	4 $10,445
Dominican Republic	1 $1,858	1 $1,800	2 $3,372	4 $5,173	22 $23,640	21 $13,323	22 $39,276	73 $88,442
Dutch	.....	1 $595	1 $1,463	.....	2 $2,095	2	2 $1,104	8 $5,257
French	.....	.....	2 $3,975	1 $2,310	7 $13,305	26 $49,626	34 $3,650	70 $105,724
Haiti	3 $5,553	.....	.....	.....	2 $1,324	11 $10,578	6 $4,494	22 $21,649

Seven Years Show Progress

year, but indicate the cultivation of a broad and markets produced by the war pressure

	1913	1914	1915	1916	1917	1918	1919	Total All Years
South America:								
Argentina	35 $78,000	48 $65,225	3 $2,910	45 $33,063	141 $146,255	51 $50,124	67 $131,817	390 $489,394
Bolivia					20 $48,590	14 $24,958	12 $38,716	46 $112,264
Brazil	36 $75,073	13 $20,449	3 $2,861	11 $19,635	14 $8,300	24 $31,133	76 $81,237	177 $238,688
Chile		2 $10,743		17 $46,566	69 $160,696	220 $282,638	152 $223,733	460 $724,376
Colombia	3 $6,112		1 $1,237	4 $1,236	2 $4,998	3 $7,100	12 $12,455	25 $33,138
Ecuador	1 $2,017			2 $3,378	1 $2,050	3 $6,876	6 $10,420	13 $24,741
Guiana, British			1 $900		1 $1,529	7 $5,100	9 $9,958	18 $17,487
Dutch				1 $1,037			1 $1,000	2 $2,037
French								
Peru		3 $5,301	2 $3,484	5 $5,830	25 $48,776	73 $155,834	96 $190,677	204 $408,902
Uruguay	7 $19,280	1 $865		2 $5,818	4 $10,437	16 $15,809	63 $63,996	93 $116,205
Venezuela	23 $34,291	12 $28,228	3 $7,164	6 $13,029	14 $28,502	16 $12,410	25 $15,064	99 $138,688
Asia:								
Aden								
China		7 $12,700		39 $9,799	9 $14,287	23 $26,236	211 $387,394	289 $450,416
China, French			1 $2,451					1 $2,451
China, Japanese								
Chosen (Korea)	1 $3,500			3 $5,027		2 $1,629		6 $10,156
East Indies:								
British India		7 $12,091	7 $8,680	135 $208,067	126 $205,023	11 $20,275	80 $156,852	360 $610,988
Straits Settlements	2 $5,588	7 $14,381		17 $25,169	57 $61,881	70 $113,554	116 $203,427	269 $424,000
Other British			1 $3,300	20 $27,841	26 $38,970	3 $7,138	9 $16,475	59 $93,724
Dutch	2 $4,840	7 $14,232	11 $9,567	58 $82,586	108 $137,609	68 $162,749	331 $718,885	585 $1,130,468
French						2 $3,500	9 $10,720	11 $14,220
Hongkong			1 $4,780	3 $6,304		8 $5,371	25 $32,197	37 $44,652
Japan	21 $32,770	1 $900	1 $3,382	15 $14,528	70 $59,198	279 $317,787	1,304 $2,091,475	1,691 $2,520,040
Persia						4 $2,712		4 $2,712
Russia in Asia			596 $1,903,221	1,170 $3,546,435	515 $1,662,144		16 $22,000	2,297 $7,133,800
Siam				9 $7,036	8 $6,700	6 $4,535	10 $17,278	33 $35,549
Turkey in Asia		1 $1,354	5 $26,282	2	2 $1,143		11 $15,080	19 $43,859
Oceania, British:								
Australia	17 $23,027	32 $37,378	57 $84,142	201 $295,538	194 $237,159	109 $163,405	232 $308,630	842 $1,149,279
New Zealand	1 $1,201	39 $61,599	20 $31,575	93 $149,848	75 $119,833	74 $145,764	162 $282,812	464 $792,632
Other British				2 $2,612	1 $1,688	2 $2,404	1 $835	6 $7,537
French	2 $3,400	4 $7,625		1 $860	2 $2,750	5 $6,480	1 $1,000	15 $22,115
German				1 $1,530	3 $2,377	4 $5,518	4 $3,548	12 $12,973
Philippine Islands	43 $91,809	38 $64,805	27 $62,132	58 $88,286	53 $57,457	163 $215,106	245 $442,701	627 $1,022,314
British Africa:								
West		1 $1,260		7 $13,173	115 $124,574	27 $20,136	32 $39,984	182 $199,127
South	11 $9,476	12 $11,539	15 $40,280	36 $54,519	34 $82,957	70 $107,085	62 $94,881	240 $400,737
East						1 $787	6 $5,010	7 $5,797
Canary Islands		1 $1,203			1 $575			2 $1,778
Egypt					4 $9,624			4 $9,624
French Africa	1 $858					18 $12,963	22 $24,933	41 $38,754
Morocco				7 $9,675			2 $1,008	9 $10,683
Portuguese Africa		1 $2,604		1 $2,803	1 $2,500		6 $13,125	9 $21,032
GRAND TOTAL: Total trucks	993	784	189	96 21,265	13,996	12,200	12,242	77,559
Total value	$1,737,141	$1,181,611	$39,140,682	$56,805,548	$42,343,502	$31,874,459	$32,683,080	$205,518,013



which will not be affected by the local troubles and tendencies which might seriously affect a trade developed intensively in a single section.

There were approximately 305,000 trucks produced in this country during 1919. Of this number 12,242, or 4.01 per cent, were exported. This shows a drop in the percentage exported of .87 per cent from the previous year, but, as indicated by the figures, the drop is due, not to a falling off of exports, but to increased production.

The average value of trucks exported during the past seven years is as follows:

1913	$1,749
1914	1,507
1915	2,796
1916	2,671
1917	2,655
1918	2,612
1919	2,669

The average cost of exported trucks is thus seen to have diminished steadily from 1915 to 1918, while there was a slight rise in 1919. The difference in the figures, however, for these five years has been so slight as to indicate that the trend in prices is to remain almost stationary.

The general conclusion to be drawn from an analysis of these figures is that American truck exporters are developing and cultivating a permanent and lucrative foreign market in an effective manner.

Tractor Production 300,000 for 1920

THE production of tractors multiplied about 40 times during the 10 years from 1910 to 1919, inclusive. From 4500 machines in 1910 production increased to 175,000 in 1919.

Production did not show a progressive increase during all those years, however. The four years from 1909 to 1912, inclusive, were the years when the big gas tractor was playing its disastrous role in the Northwest. Both the production and the demand for the big machine reached their climax in 1912, which year is regarded as the banner year for the leviathan machine. Production in that year reached 11,440. Production figures for each of the four years are as follows:

1909.....	2,270	1911.....	7,400
1910.....	4,500	1912.....	11,440

The big gas tractor bubble burst in 1913 and production fell off sharply. From 11,440 in 1912 it declined to 7450 in 1913.

The Big Change.—To all intents and purposes the history of tractor development, which included the transition from steam to gas, and which had followed a more or less orderly course for nearly 50 years, came to an abrupt end in 1913. For nearly half a century the tractor, first as a steam and then as a gas machine, had been growing ever larger and larger and heavier and heavier and as a power unit for the fundamental operations on the farm was used but sparingly. Only during the years following the substitution of gas for steam had the tractor been utilized for anything about the farm but heavy belt power work. With the development of the big wheat farms of the Northwest it had come into use for plowing and thousands of acres of virgin soil in the Northwestern States and in the British possessions across the border were turned by the big gas tractor with its gang of from six to twelve bottoms.

However, it took only two or three years of extensive use for such purposes to demonstrate the fact that the big tractor as a farm power unit was hopelessly uneconomic and it lost its prestige within a year. At the zenith of its popularity in 1912 its obsequies as a farm power unit were held in 1913.

With the year 1914 the gas tractor entered upon the second period of its history and development. The Bull, the first of the small agricultural gas tractors, had made its appearance the year before and immediately it had jumped into popular favor. The idea of power farming had been born and the Bull was the first machine which was able to take advantage of that fact.

During the year 1914 3000 Bull tractors

Gas Tractor

For Fiscal Years

	1914	1915	1916	1917	1918	1919	Total for All Years
Europe:							
Austria-Hungary	*20* $58,977						*20* $58,977
Belgium						*13* $16,946	*13* $16,946
Bulgaria	*8* $9,433						*8* $9,433
Denmark			*7* $23,905	*7* $9,130	*1* $2,370	*194* $240,957	*209* $276,362
Finland						*5* $6,800	*5* $6,800
France	*2* $4,986	*25* $100,500	*284* $744,240	*1,204* $1,259,232	*2,167* $2,428,335	*3,460* $4,512,359	*7,132* $9,049,652
Germany	*47* $121,652						*47* $121,652
Greece					*94* $95,500	*153* $93,450	*247* $188,950
Italy	*1* $3,683			*135* $125,043	*5,406* $4,742,132	*2,929* $3,881,869	*8,471* $8,752,727
Netherlands	*1* $3,750			*4* $7,400		*2* $3,200	*7* $14,350
Norway				*39* $58,648	*1* $1,093	*174* $190,873	*214* $250,614
Portugal				*1* $495	*20* $31,239	*31* $33,255	*58* $64,989
Roumania	*23* $55,320					*79* $68,800	*102* $124,120
Russia in Europe	*67* $196,617	*26* $69,370	*44* $84,550	*136* $353,666	*366* $959,424		*639* $1,663,627
Serbia, Montenegro			*20* $27,000				*20* $27,000
Spain	*2* $7,405		*1* $1,050	*53* $55,169	*12* $11,728	*27* $37,704	*95* $113,056
Sweden				*6* $5,304		*113* $84,737	*119* $90,041
Switzerland					*1* $2,339		*1* $2,339
Turkey in Europe						*10* $14,564	*10* $14,564
United Kingdom:							
England		*80* $343,922	*641* $1,843,229	*2,926* $4,747,841	*8,862* $8,807,131	*2,273* $2,392,547	*14,782* $18,134,670
Scotland		*1* $1,562			*64* $105,882	*9* $52,466	*74* $159,910
Ireland				*51* $29,325		*60* $65,619	*111* $94,944
North America:							
British Honduras		*1* $298		*3* $8,315			*4* $8,613
Canada	*382* $637,162	*252* $281,867	*689* $693,328	*2,909* $3,047,523	*5,824* $5,774,288	*8,023* $7,382,267	*18,079* $17,816,435
Central American States:							
Costa Rica				*1* $2,275		*1* $1,685	*2* $3,960
Guatemala					*1* $802	*3* $2,685	*4* $3,487
Honduras	*2* $3,682		*5* $8,928	*5* $7,302		*7* $12,285	*19* $32,197
Nicaragua	*2* $2,170				*2* $2,800	*2* $3,781	*6* $8,751
Panama		*2* $9,488			*16* $12,412	*15* $12,555	*33* $34,455
Salvador				*1* $2,800		*2* $2,575	*3* $5,375
Mexico	*5* $13,600	*5* $12,400	*20* $41,499	*59* $91,902	*285* $430,472	*289* $307,615	*669* $897,438
West Indies, British:							
Barbados					*3* $2,015	*2* $2,353	*5* $4,368
Jamaica					*1* $230	*13* $15,148	*14* $15,378
Trinidad and Tobago					*1* $1,632	*7* $11,480	*8* $13,112
Other British					*2* $1,708	*3* $2,048	*5* $3,756
Cuba	*15* $54,845	*24* $77,531	*60* $135,309	*179* $209,157	*165* $247,662	*246* $302,318	*689* $1,026,822
Dominican Republic			*1* $858	*1* $4,650	*4* $3,590	*9* $2,528	*15* $11,616
Danish West Indies (Virgin Isles)						*4* $4,302	*4* $4,302
Dutch		*1* $1,525					*1* $1,525
French					*2* $2,095	*4* $6,523	*6* $8,618
Haiti					*1* $1,150	*6* $5,075	*7* $6,225
South America:							
Argentina	*73* $103,915	*4* $1,828	*18* $37,926	*5* $7,848	*7* $4,050	*275* $226,971	*382* $382,538
Bolivia						*4* $6,300	*4* $6,300
Brazil	*6* $8,326	*1* $2,724	*5* $3,216	*8* $7,499	*4* $11,600	*89* $68,966	*113* $102,331
Chile	*4* $10,540	*1* $1,346		*1* $3,175	*16* $18,296	*44* $60,012	*66* $93,369
Colombia	*1* $3,620		*1* $2,100		*12* $10,728		*14* $16,448

Engine Exports

Ending June 30, 1919

	1914	1915	1916	1917	1918	1919	Total for All Years
South America—Continued:							
Ecuador						1 $1,100	1 $1,100
Guiana, British				1 $3,100	16 $13,727	46 $55,302	63 $72,129
Paraguay	1 $1,638				6 $7,111		7 $8,749
Peru	2 $5,965	2 $3,871		10 $8,237	83 $101,594	342 $385,906	439 $505,573
Uruguay						29 $23,559	29 $23,559
Venezuela	3 $3,753			3 $8,237		35 $45,230	41 $57,220
Asia:							
China				4 $3,396		4 $9,453	8 $12,849
China, leased territory:							
British				1 $878			1 $878
Japanese				2 $2,020			2 $2,020
East Indies:							
British:							
British India	2 $4,629			3 $1,900	1 $2,842	27 $30,709	33 $40,080
Straits Settlements		1 $3,000			1 $2,063	15 $11,418	17 $16,481
Dutch		5 $18,217	3 $12,421	5 $24,400	2 $10,241	24 $31,547	39 $96,826
French					1 $4,900		1 $4,900
Japan				14 $20,332	5 $15,016	26 $91,681	45 $127,029
Russia in Asia				113 $305,192		1 $1,500	114 $306,692
Turkey in Asia	1 $2,762						1 $2,762
Oceania:							
British:							
Australia	42 $71,428	18 $37,144	32 $37,441	22 $25,015	21 $19,505	206 $223,389	341 $413,922
New Zealand			16 $16,839	54 $57,863	40 $46,499	365 $248,725	475 $369,926
Other British				2 $2,964			2 $2,964
French				1 $1,453			1 $1,453
Philippine Islands		8 $12,992	2 $9,560	7 $9,137	13 $28,107	336 $459,704	361 $519,500
Africa:							
British Africa:							
West	1 $4,760						1 $4,760
South	4 $11,399	3 $3,613	2 $1,527	4 $3,240	36 $21,267	204 $107,718	253 $148,764
East Africa						6 $3,380	6 $3,380
Egypt	3 $7,988					9 $5,559	12 $13,547
French Africa	1 $2,289			8 $8,305	1 $1,124	39 $51,337	49 $63,055
Morocco						91 $61,920	92 $63,100
Portuguese Africa			1 $1,620		3 $7,144		4 $8,764
Totals	721 $1,416,294	455 $983,198	1,858 $3,726,496	7,988 $10,529,368	23,560 $23,995,023	20,386 $21,984,755	54,968 $62,635,134

were sold, one-third of the total production of tractors for that year. The next year, while sales of the Bull increased to 5000, this number represented but one-quarter of the tractor production for the year, so rapid was the increase in production. The small agricultural tractor had arrived and types and styles and number produced all were increasing with great rapidity.

Production Jumps.—How rapidly the production of the small agricultural type of tractor increased will be shown by the following table:

Tractor Production by Years.

1913.....	7,450	1917.....	62,750
1914.....	10,400	1918.....	135,000
1915.....	21,900	1919.....	175,000
1916.....	28,000		

From all indications there will be a still more marked increase in production during 1920. An investigation made by AUTOMOTIVE INDUSTRIES shows that 72 tractor concerns will build as many as 100 machines each or more during the coming year and that the aggregate production of these companies will be 309,000 tractors. Against this may be set the figures of an investigation made by one of the big implement houses, which gives a total of 319,500.

As production estimates almost always exceed actual performance, it is probable that an estimate of 300,000 tractors for 1920 will not be far from the mark.

Taking the whole period from 1909 to 1919 into survey, the curve of production shows one retrogression and one serious check. The former was coincident with the decline of the big gas tractor and covered the transition period between the disappearance of the big machine and the appearance and acceptance of the small agricultural tractor. This period covered the years 1912, 1913 and 1914.

The check in the increase in production, which amounted to a veritable slump, manifests itself in the relatively small increase shown as between production in 1918 and 1919. A wet spring and uncertainty regarding the course of prices, the latter being accentuated by the sensational reductions in prices announced at the time of the Wichita demonstration last summer, were the chief contributing causes of the slump.

The Future.—That the trade has recovered from all apprehension regarding the latter is evident by the size of the estimates for production during the year to come.

In this connection some speculation as to the probable number of tractors there may be in use on the farms of the country may be interesting. The United States Department of Agriculture estimated that 34,371 tractors were in use on the farms at the close of the year 1917. Just a year later, or on Jan. 1, 1918, 140,000 tractors in use on the farms was the estimate made by Prof. Frank B. White, who made a personal investigation in behalf of one of the farm papers.

Just how many tractors have been sold to farmers during the year just closed it is impossible to say at this time. A conservative and usually competent authority made an investigation early in the summer and estimated that between Jan. 1, 1919, and about Sept. 1, 1919, something like 80,000 tractors had been sold and delivered onto the farms. Assuming the approximate correctness of that estimate, and making allowances for the tractors sold during the last three months and for the natural replacement, it is believed a fair assumption to presume there are at the present time about 250,000 tractors in use on the farms of the country.

This would indicate that the tractor industry is to enter upon the season of 1920 with a considerable number of tractors on hand, either remaining unsold in the warehouses of the manufacturers or in the hands of the dealers. It is not unlikely that dealer stocks in certain sections of the country are reasonably large. However, with the increasing popularity of the tractor and the improvements which have taken place in tractor selling organizations, it is not believed that what stocks remain unsold at this time will retard much the development of normal tractor demand next year.

Formula for Calculating Piston Displacement in Cubic Inches When Cylinder Dimensions Are Given in Millimeters

$$D \text{ (cu. in.)} = \frac{nB^2L}{20{,}864}$$

where n = number of cylinders

B = cylinder bore in millimeters

L = stroke in millimeters.

Technical Specifications of A

Line No.	Manufacturer	Tractor and Model	Drawbar horsepower	Belt horsepower	Number plows recommended	Size separator recommended	Pounds pull drawbar	Weight	Price	Traction	Diameter drive wheels	Make of engine	No. and type of cylinder	Bore and stroke	Normal R. P. M.
1		Oil Pull	12	20	3	22 x 36	2150	6682	.....	Wh.	51	Own	2 Hor.	6 x 8	560
2	Advance-Rumely Thresher Co., Laporte, Ind.	Oil Pull	16	30	4	28 x 44	2850	9600	.....	Wh.	56	Own	2 Hor.	7 x 8½	530
3		Oil Pull	20	40	5-6	32 x 52	3750	12820	.....	Wh.	64	Own	2 Hor.	8 x 10	450
4		Oil Pull	30	60	8-10	36 x 60	5900	26700	.....	Wh.	80	Own	2 Hor.	10 x 12	375
5															
6	Allis-Chalmers Mfg. Co., Milwaukee, Wis.	Allis-Chalmers, 18-30	18	30	3-4	.....	2400	6200	$1,785	Wh.	50	Own	4 Ver.	4¾ x 6½	830
7															
8	Appleton Mfg. Co., Batavia, Ill.	Appleton	12	20	2-3	22	2000	4000	1,650	Wh.	54	Buda	4 Ver.	4¼ x 5½	1009
9		Aultman-Taylor	15	30	4	28	2800	7500	2,300	Wh.	70	Clim.	.....	5 x 6½	900
10												Wauk.	4 Ver.	4¾ x 6¾	
11	Aultman-Taylor Machinery Co., Mansfield, Ohio	Aultman-Taylor	22	45	6	32	4800	13000	3,700	Wh.	70	Own	4 Hor.	5⅛ x 8	600
12		Aultman-Taylor	30	60	8-12	.....	8000	23000	4,800	Wh.	90	Own	4 Hor,	7 x 9	500
13															
14	Automotive Corp., Toledo, Ohio	Automotive, B-B	12	25	2	30	1800	.....	.....	Wh.	40	Herc.	4 Ver.	4 x 5⅛	1030
15															
16		Avery, 8-16	8	16	2-3	22 x 32	1500	4900	.....	Wh.	50	Own	2 Hor.	5½ x 6	600-700
17															
18		Avery, 12-25	12	25	3-4	20 x 30	2800	7500	.....	Wh.	56	Own	2 Hor.	6½ x 7	600-700
19	Avery Co., Peoria, Ill.	Avery, 14-28	14	28	3-4	24 x 36	3000	6800	.....	Wh.	60	Own	4 Hor.	4⅝ x 7	700-800
20		Avery, 18-36	18	36	4-5	24 x 36	3500	9250	.....	Wh.	65	Own	4 Hor,	5½ x 6	650-750
21						28 x 46									
22		Avery, 25-50	25	50	5-6	28 x 46	4800	12500	.....	Wh.	69	Own	4 Hor.	6½ x 7	600-700
23						32 x 54									
24		Avery, 40-80	40	80	8-10	36 x 60	7600	22000	.....	Wh.	87½	Own	4 Hor.	7¾ x 8	500-600
25															
26	Bates Mch. & Trac. Co., Joliet, Ill.	Steel Mule	15	22	3-14	28-30	.....	4400	1,985	Cr.	.....	Erd	4 Ver.	4 x 6	900
27															
28		Tracklayer, A	35	60	9-14	.....	6500	17500	5,750	Cr.	.....	Own	4 Ver.	6½ x 3½	650
29	C. L. Best Gas. Trac. Co., San Leandro, Calif.														
30		Tracklayer, B	12	25	3-14	.....	2000	5100	2,600	Cr.	.....	Own	4 Ver.	4⅝ x 5¼	850
31															
32	Buckeye Mfg. Co., Anderson, Ind.	Trundaar, 10	25	40	4	.....	3750	8500	3,750	Ch. T.	.....	Wauk.	4 Ver.	5 x 6¼	900
33	Bull Tractor Co., Anderson, Ind.	Bull	12	24	2-3	26	1000	4996	1,200	.....	60	Toro	2 Hor.	5½ x 7	750
34	Burn-Oil Tractor Co., Peoria, Ill.	Burn-Oil, A	15	30	3	26	.....	5500	1,550	.....	56	Own	2 Hor.	6¾ x 7	700
35															
36	J. I. Case Plow Works, Racine, Wis.	Wallis, K	15	25	3	.....	2000	3560	.....	Wh	48	Own	4 Ver.	4¼ x 5¾	850
37		Case, 22-40	22	40	4-6	26x46	3428	9500	2,600	Wh.	56	Own	4 Ver.	5½ x 6¾	850
38															
39	J. I. Case T. M. Co., Racine, Wis.	Case, 15-27	15	27	3	20x36	2500	5750	1,600	Wh.	52	Own	4 Ver.	4½ x 6	900
40		Case, 10-18	10	18	2	20x28	1665	3400	1,200	Wh.	42	Own	4 Ver.	3⅞ x 5	1050
41															
42	Cleveland Trac. Co., Cleveland, Ohio.	Cletrac, H	12	20	2-14	24-36	1700	3300	1,585	Cr.	.....	Weid.	4 Ver.	3¾ x 5½	1250
43	Dart Truck & Trac. Corp., Waterloo, Ia.	Blue J	15	30	3-4	28	2500	4500	2,000	Wh.	42	Buda	4 Ver.	4½ x 6	1050
44		Blue J, TE	12	25	3	24	2250	4300	1,850	Wh.	42	Buda	4 Ver.	4¼ x 5½	1050
45	Dauch Mfg. Co., Sandusky, Ohio.	Sandusky, J	10	20	3-14	22	2000	4080	1,650	Wh.	48	Own	4 Ver.	4¼ x 5¼	1050
46		Sandusky, E	15	35	4-14	30	3500	7670	2,500	Wh.	56	Own	4 Ver.	5 x 6½	750
47		Leader, B	12	24	2	20	2000	5200	1,285	.....	48	Own	2 Hor.	6¼ x 6	800
48	Dayton-Dowd Co., Quincy, Ill.	Leader, C	18	36	3-4	28	4000	6500	2,495	Cr.	.....	Twin	4 Ver.	5 x 7½	750
49		Leader, CX	20	40	4-5	28	5000	6500	2,750	Cr.	.....	Doman	4 Ver,	6 x 7	750
50	Eagle Mfg. Co., Appleton, Wis.	Eagle, F	12	22	2-3	24	2400	5850	1,400	Wh.	48	Own	2 Hor.	7 x 8	450
51		Eagle, F	16	30	3-4	28-30	3200	7100	1,850	Wh.	52	Own	2 Hor.	8 x 8	450
52	Electric Wheel Co., Quincy, Ill.	Allwork, C	14	28	3	28	3000	5000	.....	Wh.	48	Own	4 Ver.	5 x 6	800
53		E-B, 12-20, AA	12	20	3-14	24	2000	4355	.....	Wh.	54	Own	4 Ver.	4¾ x 5	900
54	Emerson, Brantingham Co., Rockford, Ill.	E-B, 20-35	20	35	5-14	28	3300	9700	.....	Wh.	72	Own	4 Ver,	5 x 7	700
55		E-B, Reeves	40	65	8-10	44	10000	22750	.....	Wh.	90	Spec.	4 Ver.	7¼ x 9	500
56		E-B, Q	12	20	3-14	24	2000	6500	.....	Wh.	60	Own	4 Ver.	4¾ x 5	850
57	Fageol Motors Co., Oakland, Calif.	Fageol, D	9	12	2-14	.....	1450	3500	1,525	.....	48	Lyc.	4 Ver.	3½ x 5	1250
58					3-10										
59	Ford & Son, Inc., Henry, Dearborn, Mich.	Fordson	12	20	2	20-34	.....	2750	750	.....	42	Own	4 Ver.	4 x 5	1000
60															
61															
62	Four-Drive Trac. Co., Big Rapids, Mich.	Fitch, 4	20	35	3-4	28-30	3200	6000	2,800	Wh.	F- 36x12 R- 42x12	Clim.	4 Ver.	5 x 6½	850
63															
64	Frick Co., Waynesboro, Pa.	Frick	12	24	3	22-26	1400	5800	.....	.....	60	.....	4 Ver.	4 x 6	900-1000
65	General Ordnance Co., Cedar Rapids, Ia.	G-O	14	28	8-14	30	.....	4200	1,485	Wh.	46	Wauk.	4 Ver.	4½ x 5¾	1000
66	General Tractors, Inc., Chicago	Monarch, 30-18	18	30	4-14	28-32	3300	8000	2,500	Wh,	.....	Beav.	4 Ver.	4¾ x 6	900
67		Monarch, 9-16	9	16	2-14	18	1600	4000	1,550	Cr.	.....	Own	4	4 x 4	1000
68	Graham Bros., Evansville, Ind.	Graham	15	30	3	24	2750	4750	.....	Wh.	52	Hink.	4 Ver.	4½ x 5½	1000
69	Gray Tractor Co., Minneapolis, Minn.	Gray	18	36	4	28	3300	6200	.....	Drum	54	Wauk.	4 Ver.	4¾ x 6¾	850
70															
71	Hart-Parr Co., Charles City, Ia.	Hart-Parr, 30	15	30	3-14	28	3000	5185	1,395	Wh.	52	Own	2 Hor.	6½ x 7	750
72															
73	Holt Mfg. Co., Peoria, Ill.	Caterpillar, 10-ton	40	60	6-14	40-60	5000	19000	.....	Cr.	.....	Own	4 Ver.	6½ x 7	700
74		Caterpillar, 5-ton	25	40	4-14	32-52	3100	9400	.....	Cr.	.....	Own	4 Ver.	4¾ x 6	1050

Abbreviations: **Traction**—Wh., wheel; Cr., crawler; Ch. T., chain tread. **Engine**—Beav., Beaver; Veer., Veerac; Wauk., Waukesha; Buff., Buffalo; Asso Kenn., Kenneth; Spec., Special; Wisc., Wisconsin; Hink., Hinkley. **Cylinders**—Ver., vertical; Hor., horizontal; Opp., opposed. **Fuel**—G, gasoline; K, kero Stromberg; Till., Tillotson; Zen., Zenith; Car., Carter. **Air Cleaner**—Donal., Donaldson; Ben., Bennett; Holl., Holley; John., Johnson; Opt., Optional. Fulle., Twin, Twin Disk; Hill., Hilliard; Detf., Detlaff; Para., Paragon. **Gearset**—B. & S. Brown & Sharpe; Nutt., Nuttall. **Gearset type**—Sl. G., sliding drive—S. G., spur gear; G., gear; Ch., chain; R. P., roller pinion; I. G., internal gear; B. P., bull pinion. **Drive**—Op., open; In., inclosed. **Radiator**—C

American Farm Tractors

Line No.	Fuel	Make and size of carburetor	Make of air cleaner	Make of magneto	Make of clutch	Make of gearset	Type of gearset	Make of radiator	Make of bearings in transmission	Make of bearings in front axle	Make of bearings in rear axle	Belt pulley diameter	Belt pulley R. P. M.	Belt speed F. P. M.	Speeds forward	Speed range M. P. H.	Recommended plowing speed	Final drive	Drive	Furrow wheel	Line No.
1	K-D	2¼–Own	Donal.	Bosch	Own	Own	Sl. G.	Own	Own	Own	Hyatt	19	560	2790	2	2.1–3.26	2.1	B. G.	Op.	No	1
2	K-D	2½–Own	Donal.	Bosch	Own	Own	Sl. G.	Own	Own	Own	Hyatt	23	530	3190	2	2.1–3	2.1	G. B.	Op.	No	2
3	K-D	2¾–Own	Donal.	Bosch	Own	Own	Sl. G.	Own	Own	Own	Hyatt	26	450	3060	2	2–3.2	2	B. G.	Op.	No	3
4	K-D	3¼–Own	None	Bosch	Own	Own	Sl. G.	Own	Own	Own	Own	36	375	3540	1	1.9	1.9	B. G.	Op.	No	4
5				K-W																	5
6	K	1½–King	Ben.	Eise.	Own	Own	Sl. G.	Own	Hyatt	Own	Hyatt	15	830	3200	2.3–2.8	.....	2.8	.....	.....	Yes	6
7				Bosch																	7
8	G-K	1¼–Scheb.	Ben.	Bosch	B. & B.	Nutt.	Sl. G.	Perfex	Hyatt	Own	Hyatt	7½	825	2600	2	2¼–3½	.....	I. G.	.....	Yes	8
9	G-K-D	1⅜–King.	Ben.	Eise.	Own	Own	Sl. G.	Hooven	Hyatt	Own	Own	20	450	2400	1	2.2–2.49	2.55	I. G.	.....	Yes	9
10																					10
11	G-K-D	2 –King	.....	Eise.	Own	Own	Sl. G.	Own	Own	Own	Own	20	600	3150	.....	1–2.93	2.13	B. G.	.....	No	11
12	G-K-D	2½–King.	.....	Eise.	Own	Own	.....	Own	Own	Own	Own	24	500	3150	2.2	1–2.2	2.2	B. G.	.....	No	12
13																					13
14	G-K	1⅜–King.	Ben.	Eise.	B. & B.	Own	Sl. G.	McCord	U. S. Gurney Hyatt	Timk.	Timk.	10	996	2600	2	2¼–4	2¼	I. G.	In.	Yes	14
15																					15
16	G-K																				16
17	D-A	1¼–King	.....	K-W	Own	Own	C. M.	Own	.....	Own	Own	17½	600	2750	2	1¾–3	1¾	S. G.	Op.	.....	17
18	G-K-D	1½–King	.....	K-W	Own	Own	C. M.	Own	.....	Own	Own	19½	570	2910	2	1¾–2¾	1¾	S. G.	Op.	.....	18
19	G-K-D	1¼–King.	.....	K-W	Own	Own	C. M.	Own	.....	.....	Own	16	700	2930	2	2⅛–3½	2	S. G.	Op.	.....	19
20	G-K-D	1½–King.	.....	K-W	Own	Own	C. M.	Own	.....	Own	Own	18	650	3065	2	2–3	2	S. G.	Op.	.....	20
21																					21
22	G-K-D	2–King.	.....	K-W	Own	Own	C. M.	Own	.....	Own	Own	22	500	2880	2	2–3	2	S. G.	Op.	.....	22
23																					23
24	G-K-D	2–King.	.....	K-W	Own	Own	C. M.	Own	.....	Own	Own	26	500	3400	2	1¾–2⅔	1¾	S. G.	Op.	.....	24
25											T. & H.										25
26	G-K-D	4¼–Ben.	Ben.	Dixie	B. & B.	Own	Sl. G.	Modine	Timk.	Timk.	T. & H.	12	725	2300	2	2.33–3.5	2.33	S. G.	.....	.....	26
27									Hyatt												27
28	D	2–Ens.	Ben.	Bosch	Own	Own	Sl. G.	Own	Timk.	.....	Timk.	16	650	2720	2	3–2	3	I. G.	.....	.....	28
29									Hyatt												29
30	D	1½–Ens.	Ben.	Split.	Own	Own	Sl. G.	Own	Timk.	.....	Hyatt	9	9000	1971	2	2¼–3	3	I. G.	.....	.....	30
31									Hyatt												31
32	G-K-D	Strom.	Own	Bosch	Hill.	Own	Sl, G.	Modine	Timk.	.....	H. & T.	.....	900	2600	2	1.3–2.5	.....	S. G.	In.	.....	32
33	G-K-D	1½–King.	Donald.	K-W	.....	.....	.....	.....	.....	.....	Hyatt	12	750	.....	1	2.4–2¾	2.4	B. G.	.....	.....	33
34	K	1½–Scheb.	Ben.	K-W	Own	Own	.....	Spec.	S.K.F. Hyatt	Hyatt	Hyatt	13	750	750	2	1¾–3	2¾	G.	.....	.....	34
35																					35
36	G-K-D	1¼–Ben.	Ben.	Bosch	Twin	Own	Sl. G.	Modine	Timk.	Hyatt	Timk.	18	450	.....	2	1½–3½	2½	S. G.	.....	.....	36
37	K	2–King.	Own	Bosch	Own	Own	Sl. G.	Own	Hyatt	Timk.	Hyatt	16½	850	3669	2	1.2–32	2.2	S. G.	In.	No	37
38									Timk.												38
39	K	1⅜–King.	Own	Bosch	Own	Own	Sl. G.	Own	Hyatt	Own	Hyatt	16	900	3762	2	2¼–3½	2¼	S. G.	In.	No	39
40	K	1⅛–King.	Own	King.	Own	Own	Sl. G.	Own	Hyatt	Own	Hyatt	14¼	1050	3916	2	2¼–3½	2¼	S. G.	In.	No	40
41				Eise.																	41
42	G-K-D	1–King.	Own	Teagle	B. & B.	Own	.....	McCord	.....	.....	.....	8	1250	2600	1	3½	3½	I. G.	.....	.....	42
43	G	1¼–King.	Ben.	Split.	Delt.	Own	Sel. G.	Own	Gurney	Timk.	Timk.	12	750	2356	3	1¼–6	2½	B. G.	In.	Yes	43
44	G	1¼–King.	Ben.	Split.	Delt.	Own	Sel. G.	Own	Gurney	Timk.	Timk.	12	750	2356	3	1¼–6	2½	B. G.	In.	Yes	44
45	G-K-D	1¼–King.	Ben.	Dixie	Own	Own	Sel.	Perfex	Hyatt N.D.	Own	Own	10	1000	2600	2	2–3	2	I. G.	.....	Yes	45
46																					46
47	G-K-D	2 –King.	Ben.	Dixie	Own	Own	Sel.	C. & P.	Own	Own	Own	15	800	2950	3	2–5½	2	I. G.	.....	No	47
48	K	1½–King.	Own	King.	Own	Own	Sel.	Eureka	Own	Own	Own	14	800	2800	2	2¼–3½	2¼	I. G.	Op.	.....	48
49	K-D	1¾–King.	Ben.	K-W	Own	Own	Sel.	Eureka	Own	Own	Own	14	750	2700	2	1.8–2½	1.8	Ch.	Op.	.....	49
50	G-K-D	1½–Holl.	Ben.	Dixie	Own	Own	Sel.	Eureka	Own	Own	Own	14	750	2700	2	1.8–2½	1.8	Ch.	Op.	.....	50
51	G-K	1½–Linga	Own	Dixie	Own	Own	Sl. G.	Perfex	Hyatt	Own	Own	20	450	2350	2–3	1½	2	G.	.....	Yes	51
52	G-K	2 –Linga	Own	Dixie	Own	Own	Sl. G.	Perfex	Hyatt	Own	Own	24	450	2827	2–3	1½	2	G.	.....	Yes	52
53	K	1½–King.	Ben.	King.	Own	Own	Sl. G.	Perfex	Hyatt	.....	.....	13½	800	2500	3	1⅞–3¾	2½	B. G.	.....	.....	53
54	K	1½–Ben.	Ben.	K-W	Own	Own	Sl. G.	Modine	Hyatt	Own	Hyatt	12	900	2800	2	1.81–2.33	2.33	G.	In.	No	54
55	K	1½–Ben.	Ben.	K-W	Own	Own	Sl. G.	Perfex	Hyatt	Own	Hyatt	16	597	2700	2	1.71–2.26	2.26	G.	Op.	Yes	55
56	K	2½–Ben.	Ben.	K-W	Own	Own	Sl. G.	Perfex	Own	Own	Own	22	500	2850	1	2	2	B. G.	Op.	Yes	56
57	K	1½–Ben.	Ben.	K-W	Own	Own	Sl. G.	Perfex	Hyatt	Own	Hyatt	12	708	2225	3	1.64–2.25–3.4	3.4	G.	Op.	Yes	57
58	G-K-D	1–Zen.	Own	Dixie	Own	Own	C. M.	Modine	Timk.	Timk.	Timk.	8	1250	2000	1	¾–3	2¼	S. G.	.....	.....	58
59	K	Own	Own	Own	Own	Own	Sl. G.	Own	Gurney	Timk.	Gurn. S.R.B.	9½	1000	.....	3	1–8	2¾	Worm	In.	.....	59
60																					60
61	K	1½–King.	Ben.	Dixie	B. & B.	Cotta	Ind. Cl.	Spirex	Timk.	Timk.	Timk.	14	650	2275	3	¾–4	2½	F-Bevel	.....	No	61
62																		R-Worm			62
63																					63
64	K	King.	Ben.	King.	Own	Nutt.	S.	Perfex	Hyatt	Own	Own	13	900	3000	.....	2.3–3.8	2½	S. G.	.....	Yes	64
65	G-K	1¼–King.	Ben.	Eise.	.....	Own	C. M.	Perfex	S.K.F.	.....	.....	10	970	.....	6	1¾–3	2½	S. G.	In.	No	65
66	G-K	1½–King.	Ben.	K-W	Own	Own	Sl. G.	Perfex	Hyatt	.....	.....	16	600	2700	3	1½–3½	2¼	Ch.	Op.	No	66
67	G-K	1 –King.	Ben.	K-W	Twin	Own	Sl. G.	Perfex	Hyatt N.D.	.....	.....	14¾	665	2600	3	1½–3½	2¼	G.	In.	No	67
68																					68
69	K	1¼–Strom.	Own	Berl.	Own	Own	Sl. G.	McCord	Hyatt	Timk.	Hyatt	12	930	2700	2	2½–4½	2¾	S. G.	In.	Yes	69
70	G-K	1½–Ben.	Ben.	Bosch	Own	Own	Sl. G.	S-J	Hyatt	Timk.	Own	11	850	2600	1	2–2½	2½	Ch.	.....	.....	70
71																					71
72	K	1½–Scheb.	Own	K-W	Own	Own	Sl. G.	S-J	S.K.F. Hyatt	Own	.....	14	750	2750	2	2–3	3	I. G.	.....	Yes	72
73	G	2–King.	Donald.	K-W	Own	Own	Sl. G.	Own	Hyatt	Hyatt	Hyatt	14	800	2900	3	1.65–4.75	3	G.	In.	No	73
74	G	1½–Scheb.	Donald.	Eise.	Own	Own	Sl. G.	Modine	Hyatt	Hyatt	Hyatt	12	1000	2700	3	1.5–5.7	3	G.	In.	No	74

, Associated Manufacturers; Auto., Automatic; Weid., Weidley; Clim., Climax; Twin, Twin City; Cont., Continental; Ruten., Rutenber; Over., Overland; sene; D, distillate. **Carburetor**—Ray., Rayfield; King., Kingston; Holl., Holley; Scheb., Schebler; Ben., Bennett; Zeph., Zephyr; Ens., Ensign; Strom., **Magneto**—A-K., Atwater Kent; Sum., Sumter; Eise., Eisemann; Berl., Berling. **Clutch**—B. & B., Borg & Beck; Bier., Bierman; Spec., special; Full., ng gear; Sel. G., selective gear; Fr., friction; Plan., planetary; Sl. J. C., sliding jaw clutch; C. M., constant mesh; Incl. Cl., Individual clutch. **Final** Chandler; S-J., Shotwell-Johnson.

Technical Specifications of

Line No.	Manufacturer	Tractor and Model	Drawbar horsepower	Belt horsepower	Number plows recommended	Size separator recommended	Pounds pull drawbar	Weight	Price	Traction	Diameter drive wheels	Make of engine	No. and type of cylinder	Bore and stroke	Normal R. P. M.
75	Huber Mfg. Co., Marion, Ohio	Huber, 12-25	12	25	3-14	24 x 42	2400	5000	.....	Wh.	60	Wauk.	4 Ver.	4¼ x 5¾	900
76	Illinois Tractor Co., Bloomington, Ill.	Illinois, C	18	30	4	24-28	3500	5200	2,375	Wh.	54	Clim.	4 Ver.	5 x 6½	800
77	International Harvester Co., Chicago	International	8	16	2	.....	1350	3600	.....	Wh.	40	Own	4 Ver.	4¼ x 5	1000
78		Titan	10	20	3	.....	1800	5710	.....	Wh.	54	Own	2 Hor.	6½ x 8	575
79		International	15	30	4	.....	2500	8990	.....	Wh.	66	Own	4 Hor.	5¼ x 8	575
80	J. T. Tractor Co., Cleveland, Ohio	J. T., N	16	40	3	30	3200	6500	2,800	Cr.	.....	Chief	4 Ver.	4¾ x 6	1000
81	Keck-Gonnerman Co., Mt. Vernon, Ind	Keck-Gonnerman, B	12	24	3	24 x 40	2500	6500	1,500	Wh.	60	Own	2 Hor.	7¼ x 8	700
82	Kinnard & Sons Mfg. Co., Minneapolis, Minn.	Flour City	40	70	8-10	36	.....	21000	.....	.....	96	Own	4 Ver.	7½ x 9	450-500
83		Flour City	30	50	6-8	32	.....	14000	.....	.....	84	Own	4 Ver.	6¼ x 7	550-600
84		Flour City	20	35	4-5	28	.....	10000	.....	.....	72	Own	4 Ver.	5¼ x 6	800
85	LaCrosse Trac. Co., LaCrosse, Wis.	LaCrosse, G	12	24	3	22	2000	4000	1,250	Wh.	56	Own	2 Hor.	6 x 7	750
86	Lauson, John, Mfg. Co., New Holstein, Wis.	Full Jewell	15	30	3-4	24-30	3000	6500	2,150	Wh.	54	Beav.	4 Ver.	4¾ x 6	950
87	Liberty Tractor Co., Minneapolis, Minn.	Liberty	18	32	4	30	3380	5900	2,475	Wh.	48	Clim.	4 Ver.	5 x 6½	850
88	Minneapolis Steel & Machinery Co., Minneapolis, Minn.	Twin City, 12-20	12	20	3	20-24	2000	4200	1,595	Wh.	50	Own	4 Ver.	4¼ x 6	1000
89		Twin City, 16-30	16	30	4	24-28	3000	7800	2,400	Wh.	54	Own	4 Ver.	5 x 7½	650
90		Twin City, 25-45	25	45	6	32-34	6700	16000	3,800	Wh.	76	Own	4 Ver.	6¼ x 8	600
91		Twin City, 40-65	40	65	8	40	7500	23700	4,850	Wh.	84	Own	4 Ver.	7¼ x 9	535
92		Twin City, 60-90	60	90	12	40	11250	2800	5,850	Wh.	84	Own	6 Ver.	7¼ x 9	535
93	Moline Plow Co., Moline, Ill.	Universal, D	9	18	2-14	22	2100	3380	1,500	Wh.	52	Own	4 Ver.	3½ x 5	1650
94	Nichols & Shepard Co., Battle Creek, Mich.	Oil-Gas, 25-50	25	50	6	25-32x52	.....	19000	.....	Wh.	28	Own	2 Hor.	9 x 12	350-425
95		Oil-Gas, 35-70	35	70	8-10	52-64	.....	30000	.....	Wh.	32	Own	2 Hor.	10½ x 4	300-375
95	Parrett Tractor Co., Chicago Heights, Ill.	Parrett, H	12	25	3-14	.....	2800	5225	.....	Wh.	60	Buda	4 Ver.	4¼ x 5½	1000
97	Peoria Tractor Corp., Peoria, Ill.	Peoria, J	12	25	3	26	3000	5100	1,985	Wh.	56	Clim.	4 Ver.	5 x 6½	800
98	Pioneer Tractor Co., Winona, Minn.	Pioneer, 18-36	18	36	4	28	4000	6100	.....	.....	60	Own	4 Ver.	5½ x 6	750
99		Pioneer, 30	30	60	10	36	8000	24000	.....	.....	96	Own	4 Ver.	7 x 8	650
100	Plow Man Tractor Co., Waterloo, Ia.	Plow Man, 15-30	15	30	3-4	30	3000	5100	1,895	Wh.	60	Buda	4 Ver.	4½ x 6	1000
101	Pope Mfg. Co., Watertown, S. D.	Dakota, 4	15	27	3	24	2000	5400	1,750	Wh.	42	Doman	4 Ver.	4¾ x 6	800
102	Post Trac. Co., Cleveland	Post, D	.....	.....	2-14	.....	.....	3750	.....	Wh.	32	Wauk.	4 Ver.	4¼ x 5¾	800
103	Pt. Huron Eng. & T. Co., Pt. Huron, Mich.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
104	Reed Fdy. & Mach. Co., Kalamazoo, Mich.	One-Man	12	25	3	22-24	.....	5000	1,685	Wh.	60	Wauk.	4 Ver.	4½ x 5¾	1000
105	Rock Island Plow Co., Rock Island, Ill.	Heider, C	12	20	3-14	24	2000	6000	.....	.....	57	Wauk.	4 Ver.	4½ x 6¾	750
106		Heider, D	9	16	2-14	20	1500	4000	.....	Wh.	57	Wauk.	4 Ver.	4¼ x 5¾	800
107	Russel & Co., The, Massillon, Ohio	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
108	Shelby Trac. & Tr. Co., Shelby, O.	Shelby, C	9	18	2-14	20	2000	3500	.....	Wh.	42	Wauk.	4 Ver.	3¾ x 5¼	1000
109															
110	Short Turn Trac. Co., Minneapolis, Minn.	Short Turn, D	20	40	3	24	.....	5000	1,500	Wh.	65	.....	4 Ver.	4¾ x 6	950
111															
112	Square Turn Trac. Co., Norfolk, Nebr.	Square Turn, A	18	35	3	28	3200	7400	1,875	.....	60	Clim.	4 Ver.	5 x 6½	850
113	Stinson Trac. Co., Minneapolis, Minn.	Stinson, 18-36	18	36	4	28-30	.....	7100	1,800	Wh.	60	Beav.	4 Ver.	4¾ x 6	950
114	Topp-Stewart Trac. Co., Clintonville, Wis.	Topp-Stewart, B	20	35	3-5	.....	5000	7500	3,000	Wh.	42	Wauk.	4 Ver.	4¾ x 6¾	900
115	Turner Mfg. Co., Pt. Washington, Wis.	Simplicity	14	40	3	24	2600	4300	1,675	Wh.	54	Buda	4 Ver.	4¼ x 5½	1000
116	U S. Trac. & Mchy. Co., Menasha, Wis.	Uncle Sam, B-19	20	30	3	28	3000	4250	2,300	.....	50	Beav.	4 Ver.	4¾ x 6	900
117	Vim Tractor Co., Schleisingerville, Wis.	Vim	10	20	2	20	1800	3200	1,485	Wh.	48	Wauk.	4 Ver.	3¾ x 5¼	1000
118	Waterloo Gasoline Eng. Co., Waterloo, Ia.	Waterloo Boy, N	12	25	3-14	.....	2000	5900	.....	Wh.	52	Own	2 Hor.	6½ x 7	750
119	Wetmore, H. A., Sioux City, Ia.	Wetmore	12	25	2	22	.....	2900	1,385	.....	48	Ruten.	4 Ver.	4⅛ x 5½	960
120	Wisconsin Farm Trac. Co., Sauk City, Wis.	Wisconsin, E	16	30	3-4	28	3500	5440	.....	Wh.	52	Clim.	4 Ver.	5 x 6½	800
121	Yuba Mfg. Co., Marysville, Calif.	Ball Tread	12	20	3-14	.....	3500	6750	2,945	Cr.	.....	Wauk.	4 Ver.	4½ x 6¾	700
122		Ball Tread	20	35	5- 6	.....	5000	10100	4,465	Cr.	.....	Wisc.	4 Ver.	5¼ x 7	700

One- and Two-Horse Tractors

123	Allis-Chalmers Mfg. Co., Milwaukee, Wis.	General Purpose	6	12	1-16	.....	1000	2500	695	Wh.	48	Le Roi	4 Ver.	3⅛ x 4½	1000
124	Atlantic Mch. Mfg. Co., Cleveland, Ohio	Merry Garden	.....	.....	.....	.....	250	.....	185	.....	.....	.....	.....	.....	.....
125	Avery Co., Peoria, Ill.	Avery, 6-Cyl	.....	.....	.....	22x32	.....	3150	.....	Wh.	38	Own	6 Ver.	3 x 4	1200
126	Beeman Tractor Co., Minneapolis, Minn.	Beeman, F	2	4	1-7	None	260	550	285	Wh.	24	Own	1 Ver.	3½ x 4½	850
127	Elderfield Mechanics Co., Pt. Washington, N.Y.	Universal, 20	1	4	1	.....	250	950	450	.....	36	Own	1 Ver.	3½ x 5	1000
128															
129	Indiana Silo Co., Anderson, Ind.	Indiana	5	10	1	.....	900	2000	.....	Wh.	50	Le Roi	4 Ver.	3⅛ x 4½	950
130	LaCrosse Trac. Co., LaCrosse, Wis.	LaCrosse, M	7	12	1-16	18	1000	2600	750	Wh.	48	Own	2 Hor.	4 x 6	1000
131	Market Garden Trac. Co., Minneapolis, Minn.	Market Garden	2	4½	1-7	.....	.....	550	.....	.....	24	Vurac	1 Hor.	4 x 4	850
132	Midwest Engine Co., Indianapolis, Ind.	Utilitor	1½	3	1	.....	150-200	750	345	Wh.	24	Own	1 Ver.	3½ x 4½	1200
133	Scientific Farming Mchy., Minneapolis, Minn.	Princess Pat	12	25	2	24-26	2000	3500	1,750	Wh.	46	Buda	4 Ver.	4¼ x 5½	1000
134	Toro Motor Co., Minneapolis, Minn.	Toro	.....	12	212	.....	1100	2400	900	Wh.	42	LeRoi	4 Ver.	3⅛ x 4½	1200

Motor Cultivators

135	Avery Co., Peoria, Ill.	Avery, C	.....	.....	.....	.....	.....	3450	.....	Wh.	38	Own	4 Ver.	3 x 4	1200
136		Avery, 5-10 B	5	10	2-12	22 x 32	800	2600	.....	Wh.	38	Own	4 Ver.	3 x 4	1200
137	J. I. Case Plow Works, Racine, Wis.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
138	Detroit Culto-Tractor Corp., Detroit, Mich.	Detroit Culto, AA	9	16	2-14	20 x 28	1600	1800	775	Wh.	42	Own	2 Ver.	4 x 6	400
139	Emerson-Brantingham Co., Rockford, Ill.	E-B	.....	.....	None	.....	.....	3200	.....	Wh.	42	Le Roi	4 Ver.	3½ x 4½	100
140	Graham Bros., Evansville, Ind.	Graham	7½	.....	.....	.....	1000	.....	.....	Wh.	42	LeRoi	4 Ver.	3⅛ x 4½	1200
141	Toro Motor Co., Minneapolis, Minn.	Toro	.....	.....	.....	.....	1100	2700	.....	Wh.	42	LeRoi	4 Ver.	3⅛ x 4½	1200

Abbreviations: Traction—Wh., wheel; Cr., crawler; Ch. T., chain tread. Engine—Beav., Beaver; Veer., Veerac; Wauk., Waukesha; Buff., Buffalo; Kenn., Kenneth; Spec., Special; Wisc., Wisconsin; Hink., Hinkley. Cylinders—Ver., vertical; Hor., horizontal; Opp., opposed. Fuel—G, gasoline; K, kero Stromberg; Till., Tillotson; Zen., Zenith; Car., Carter. Air Cleaner—Donal., Donaldson; Ben., Bennett; Holl., Holley; John., Johnson; Opt., Optional. man; Spec., special; Full., Fuller; Twin, Twin Disk; Hill., Hilliard; Detf., Detlaff; Para., Paragon. Gearset—B. & S., Brown & Sharpe; Nutt., Nuttall. clutch. Final drive—S. G., spur gear; G., gear; Ch., chain; R. P., roller pinion; I. G., internal gear; B. P., bull pinion. Drive—Op., open; In., inclosed. Ra

American Farm Tractors

Line No.	Fuel	Make and size of carburetor	Make of air cleaner	Make of magneto	Make of clutch	Make of gearset	Type of gearset	Make of radiator	Make of bearings in transmission	Make of bearings in front axle	Make of bearings in rear axle	Belt pulley diameter	Belt pulley R. P. M.	Belt speed F. P. M.	Speeds forward	Speed range M. P. H.	Recommended plowing speed	Final drive	Drive	Furrow wheel	Line No.
75	G-K	1¼-King.	Ben.	King.	Own	Own	Sel.	Perfex	G. & H.	.....	.....	13	900	3063	2	2.43-3.75	2.43	S. G.	.....	Yes	75
76	K	1½-Strom.	Ben.	Dixie	Twin	Foote	Sl. G.	Modine	Hyatt	Hyatt	Hyatt	14	600	2400	2	2½-3.4	2½	S. G.	In.	Yes	76
77	G-K-D	-Ens.	.....	Dixie	Own	.....	Sl. G.	B. & L.	Own	Own	.....	12¼	623	.....	.....	1¾-4.1	2⅝	Ch.	In.	.....	77
78	G-K-D	-Own	.....	K-W	Own	.....	Sl. G.	.....	Own	Own	.....	18	575	.....	.....	2¼-2⅞	2⅞	Ch.	.....	.....	78
79	G-K-D	-Own	.....	K-W	Own	.....	Sl. G.	.....	Own	Own	.....	18	575	.....	.....	2¼-2⅞	2⅞	Ch.	.....	.....	79
80	K	1½-Own	Ben.	K-W	Own	Covert	Sel.	McCord	Timk.	Hyatt	Hyatt	10	1000	2600	3	1¾-5	2½	I. G.	In.	No	80
81	K	2 -Scheb.	Ben.	Bosch	Own	Own	Sl. G.	Own	.....	.....	.....	11½	700	.....	3	2½-3½	3	S. G.	.....	.....	81
82	G-K	2½-Scheb.	.....	K-W	Own	.....	.....	Modine	.....	.....	.....	34	275	.....	1	.....	2½	G.	.....	.....	82
83	G-K	2 -Scheb.	.....	K-W	Own	.....	.....	Modine	.....	.....	.....	32	275	.....	1	.....	2½	G.	.....	.....	83
84	G-K	1½-Scheb.	.....	K-W	Own	.....	Sel.	Modine	.....	.....	.....	26	350	.....	2	2¼-3	2¼	G.	.....	.....	84
85	K	1½-King.	Ben.	.....	Own	Own	.....	Modine	Hyatt	Hyatt	Hyatt	7x11	750	2125	1	2-2¾	2½	.....	.....	Yes	85
86	G-K-D	1½-King.	.....	Dixie	Own	Own	Sl. G.	Perfex	Hyatt	Timk.	Hyatt	18	475	2200	2	1¾-2½	2½	G.	In.	.....	86
87	G-K	1½-Strom.	Ben.	Dixie	Bier.	Own	.....	S-J	Hyatt	Own	Own	12	900	2825	2	2½-5	2½	S. G.	In.	Yes	87
88	G-K	1¼-Holl.	Ben.	Bosch	B. & B.	Own	Sl. G.	Modine	Hyatt	Own	Hyatt	16	650	2700	2	2.2-2.9	2.9	S. G.	In.	Yes	88
89	G-K	1½-Holl.	Ben.	K-W	Own	Own	Sl. G.	Modine	Hyatt	Own	Hyatt	17	528	2350	2	2-2.75	2¾	S. G.	In.	.....	89
90	G-K	2 -King.	.....	K-W	Own	Own	Sl. G.	Own	Own	Own	Own	20	600	3150	2	1.4-2	2	S. G.	Op.	.....	90
91	G-K	2½-King.	.....	K-W	Own	Own	Sl. G.	Own	Own	Own	Own	23	535	3200	1	2	2	G.	Op.	.....	91
92	G-K	3 -King.	.....	K-W	Own	Own	Sl. G.	Own	Own	Own	Own	23	535	3200	1	2	2	S.	Op.	.....	92
93	G	1½-Holl.	Ben.	Remy	B. & B.	Own	Sl. G.	Modine	Hyatt	.....	Hyatt	9	.....	2600	1	½-3½	3½	G.	In.	Yes	93
94	K	2½-King.	.....	Wico.	Own	Own	Sl. G.	Perfex	Own	Own	Own	9x24	.....	.....	1	2-2.42	2-2.42	S. G.	.....	.....	94
95	K	3 -King.	... .	Wico.	Own	Own	Sl. G.	Perfex	Own	Own	Own	12x30	.....	.....	1	1.86	1.86	S. G.	.....	.....	95
96	K	1¼-King.	Own	Eise.	Own	Own	Sl. G.	Perfex	.....	Hyatt	Hyatt	12	1000	3141	3	1.80-3.76	.....	I. G.	In.	.....	96
97	K	1½-Strom.	Ben.	Eise.	Own	Nutt.	Sl. G.	Eureka	Hyatt	.....	.....	14	650	2500	2	2½-4	2½	I. G.	.....	Yes	97
98	G-K	1½-King.	Ben.	K-W	Own	Own	.....	S-J	Timk.	Timk.	Timk.	14	750	.....	3	1¾-4	2½	S. G.	.....	.....	98
99	G-K	2 -King.	Ben.	K-W	Own	Own	Sl. G.	S-J	Own	Own	Own	17½	650	.....	3	1¾-4¼	2½	.....	.....	.....	99
100	G-K	1¼-Strom.	Len.	Dixie	Twin	Foote	Sl. G.	Perfex	Hyatt	Hyatt	Hyatt	14	590	2200	2	2-3	.....	.....	.....	.....	100
101	K	1¼-Linga	John.	K-W	Bier.	Own	Sl. G.	S-J	Own	Own	Own	14	800	2500	1	3	3	Ch.	.....	Yes	101
102	G-K	.....	.....	Dixie	Full.	.....	.....	.....	Timk.	Timk.	Timk.	12	.....	.....	2	2-3½	3	G.	.....	Yes	102
103	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	103
104	G-K	1¼-Ben.	Ben.	Dixie	Bier.	Own	Sl. G.	Modine	Hyatt	.....	Hyatt	14½	2600	703	2½-3½	.....	2½	B. G.	In.	Yes	104
105	G-K	1⅜-King.	Ben.	Dixie	Own	.....	Fr.	Perfex	U. S.	.....	Own	14	600	2200	7	1-4	2¼	B. G.	.....	Yes	105
106	G-K	1 -King.	Ben.	Dixie	Own	.....	Fr.	Perfex	U. S.	.....	Own	12	700	2200	7	1-5	1¼	B. G.	Op.	Yes	106
107	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	107
108	G	1 -King.	Ben.	Dixie	Full.	Full.	Sl. G.	Modine	.....	Timk.	Timk.	10	850	2200	3	1¾-4¾	2½	I. G.	In.	Yes	108
109																					109
110	G-K	1½-Opt.	Opt.	Dixie	.....	Own	Sel.	Splitex	Own	Own	Own	18	950 / 700	.....	2	2-3	2½-3	I. G.	.....	Yes	110
111													490								111
112	G-K	1½-Strom.	Ben.	Dixie	.....	Own	.....	Modine	Hyatt	Hyatt	Hyatt	12	850	2669	1	2½	2½	I. G.	.....	Yes	112
113	K	1⅜-King.	Own	Dixie	Own	Own	Sl. G.	Todd	Hyatt	Hyatt	Own	12	950	.....	1	2½-3	3	S. G.	.....	.....	113
114	G	1½-Strom.	Ben.	Eise.	B. & B.	Own	Sel.	Bremer	Hyatt	N. D.	N. D.	12	900	2600	3	1¾-4½	2½	I. G.	.....	.....	114
115	G-K	1¼-King.	Ben.	Dixie	Own	Own	.....	Perfex	Hyatt	Own	Own	14	600	600	2-2½	1¾-3	2½	.....	.....	Yes	115
116	K	1½-Ben.	Ben.	Dixie	Twin	Nutt.	Sl. G.	Perfex	Timk.	Timk.	Timk.	11	900	2600	2.6-3.8	2-4	2.6	S. G.	In.	Yes	116
117	G-K	-Ben.	Ben.	Simms	B. & B.	.....	Sl. G.	.....	.....	Gurney	Hyatt	9	1000	2300	2	2½-5	2½	I. G.	.....	Yes	117
118	K	1½-Scheb.	.....	Dixie	Own	Own	Sl. G.	Modine	Hyatt	.....	Hyatt	14	750	2750	2¼-3	2¼-3	2¼-3	S. G.	In.	Yes	118
119	G	1¼-King.	.....	Dixie	Full.	Fuller	Sl. G.	Ideal	.....	.....	Timk.	12	900	.....	3	2-5	3	I. G.	In.	Yes	119
120	K	1½-Strom.	Ben.	Eise.	B. & B.	Foote	Sl. G.	Perfex	Hyatt	.....	.....	16	600	2600	2	1½-4	2½	S. G.	In.	.....	120
121	D	1¼-Ens.	Donald.	Bosch	B. & B.	Own	Sl. G.	Own	Hyatt	.....	Hyatt	12	700	2200	3	1.5-4	2.08	B. P.	.....	.....	121
122	D	-Strom.	Donald.	Bosch	Para.	Own	Sl. G.	Own	Hyatt	.....	Hyatt	10-14	700	1835	2	2.06-3.28	2.06	I. G.	.....	.....	122

One- and Two-Horse Tractors

123	G	⅞-King.	Ben.	.....	B. & B.	Own	Sl. G.	Own	Gurney	.....	Own	10	1000	2600	2-4	1½-2.4	2.4	.....	.....	Yes	123
124	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	124
125	G-K	¾-King.	.....	K-W	Own	Own	Sl. G.	Own	... .	Own	Hyatt	12	780	2450	3	1½-4¼	2⅛	S. G.	Op.	.....	125
126	G	¾-King.	Donald	Heinze	.....	.....	Sl. G.	S-J	.....	None	None	4½	850	900	1	¾-3	2	G.	.....	Yes	126
127	G	⅞-Zen.	.....	A-K	Own	Own	.....	Mersick	.....	.....	.....	8	1000	.....	1	1-4	2	None	.....	.....	127
128				Berl.																	128
129	K	⅞-King.	Ben.	A-K	Own	Own	Sl. G.	Cand.	.....	.....	.....	.....	1200	.....	1¼-4	.....	.....	Ch.	Op.	.....	129
130	K	-King.	Ben.	.....	Own	Own	Own	Hopper	.....	Own	Own	10	1000	2600	1	1¾-2½	2½	.....	.....	Yes	130
131	G	1½-Vurac	Ben.	Berl.	Own	Own	Spec.	.....	.....	Timk.	.....	6	2000	.....	1	1½-2½	2½	Worm	.....	.....	131
132	G	⅞-King.	Own	Eise.	Own	Own	.....	Modine	Fafnir.	.....	.....	4	1200	1200	1	2-2½	2¼	B. G.	In.	.....	132
133	K	1¼-Ben.	Ben.	Dixie	B. & B.	Own	Sl. G.	S-J	Hyatt	Hyatt	Hyatt	12	1000	3100	2	2½-4½	2	I. G.	In.	Yes	133
134	G	⅞-King.	Ben.	Eise	Own	Own	Sl. G.	B. & W.	Opt.	.....	Hyatt	8	1200	2400	2	1 -3½	3½	S. G.	In.	.....	134

Motor Cultivators

135	G-K	¾-King.	.....	K-W	Own	Own	Sl. G.	Own	Hyatt	Own	Own	12	780	2450	3	1½-4¼	2⅛	S. G.	Op.	.....	135
136	G-K	¾-King.	.....	K-W	Own	Own	Sl. G.	Own	Hyatt	Own	Own	12	780	2450	3	1½-4¼	2⅛	S. G.	Op.	.....	136
137	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	137
138	G	1¼-Strom.	Own	Bosch	Own	Own	Sl. G.	Own	Hyatt	Own	Own	8	855	1800	2	1-3	2⅛	B. G.	In.	.....	138
139	G	-Holl.	Ben.	Dixie	Own	None	None	Prefex	Hyatt	Own	Hyatt	7⅛	995	.....	1-5	1½-3½	None	.....	.....	.....	139
140	G	¾-King.	Ben.	Dixie	Own	Own	Sl. G.	S-J	Hyatt	.....	Hyatt	.....	.....	.....	2	¾-3	2¾	S. G.	In.	.....	140
141	G	⅞-King.	Ben.	E. & D.	Own	Own	Sl. G.	B. & W.	....	.	Hyatt	846	1200	2400	2	1-3½	..	B. G.	In.	....	141

Asso., Associated Manufacturers; Auto., Automatic; Weld, Weldley; Clim., Climax; Twin, Twin City; Cont., Continental; Ruten., Rutenber; Over, Overland; sene; D. distillate. Carburetor—Ray., Rayfield; King, Kingston; Holl., Holley; Scheb., Schebler; Ben., Bennett; Zeph., Zephyr; Ens., Ensign; Strom., Magneto—A-K., Atwater Kent; Sum., Sumter; Eise., Eisemann, Berl., Berling; E. & D., Eiseman & Dixie. Clutch—B. & B., Borg & Beck; Bier., Bier-Gearset type—Sl. G., sliding gear; Sel. G., selective gear; Fr., friction; Plan., planetary; Sl. J. C., Sliding Jaw clutch; C. M., constant mesh; Incl. Cl., Individual diator—Chand., Chandler; S-J., Shotwell-Johnson. Bearings—H. & B., Hyatt and Bantam; G. & H., Gurney & Hyatt; T. & H., Timken & Hyatt.

4-Wheel, Reversible Trailers, by Capacities

Trade Name	Model	Capacity (Tons)	Length and Width (Frame)	Wheelbase (In.)	Tread (In.)	Chassis Weight (Lb.)	Frame Material	AXLES			WHEELS		TIRES		BODY		PRICE		Body Type
								Make	Section	Size	Material	Bearings	Type	Size	Size (In.)	Weight (Lb.)	Chassis	With Body	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Hesse	10B	⅝	*90 x40		56			Own	Sq	1⅞	W	B	P or S	30x3-28x2	90x 40				Exp.
Hesse	13-S	⅝	90 x40		56	510	L.	Own	Sq	1¼	W	B	P or S	30x3-28x2	168x 84	325			Exp.
Ohio	100B	1	*126 x63½	72	56	530	C.S.	Own	I	1½x2	W	B	S	28x2½	114x 37½	325	$300	$350	F.B.
Utility	C	1	144 x37	80	58	1750	I.S.		Sq	2	W or S	R		34x3	144x 60	1000	675	800	S.
Reliance	42R	1	144 x38	78	56	1200	C.S.	Own	Sq	1¾	W	R	S	32x3			632		Bol.
Hesse	9	1–1¼	120 x38		56	975	C.S.	Own	Rec		W	R	S	30x2½					
Lee	T-1	1¼	120 x36	75	56	1700	C.S.	Tim	I		W	R	S	36x3½	60 wide	1000	790	950	S. or Exp.
Fruehauf	C-415R	1½	144 x66		56	2575	C.S.	Own	Sq	1¼	W	R	S	34x3	144x 66	200	825	975	S. & R.
Lee	Indus	1 cu. yd.				700												245	Bol.
Detroit	B	1½	144 x36	82	56	1700	C.S.		I		W	R	S	36x3	132x 66	800	775	1000	S. & R.
Lee	Indus	1¼ cu.yd.				750												279	Bol.
Troy	110R	1½	120 x35	70	56½	1647	R.S.		Rec	1¾x2¾	W	R	S	32x3	125x 68	605	790	940	Exp.
Warner	50	1½	132 x31½	78	56		C.S.	Sheldon	I		W	R	S	36x3			875		
Lee	Indus	1½ yd.				800												300	Bol.
Hesse	8	1¾-2	120 x38			1580	C.S.	Own	Rec		W	R	S	32x3					
Arcadia	202	2	180 x70	84	58	3100	C.S.	Own	I		W	T.R.	P.O.S.	32x3½			980		
Automotive		2	144 x36		60		P.S.		Rd	2	S	R	S	36x4	144x 36		1100		
Columbia	3-T	2-3					C.S.		I		W	R	S	36x4	144x 72	1100	850	1030	S. or Exp.
Lee	T-2	2	144 x36	100	58	2200	C.S.	Tim	I		W	R	S	36x4	66	1500	1050	1245	S. or Exp.
Ohio	200-B	2	169⅝x68¼	96	56	1600	P.S.	Own	I	1½x2	W	R	S	36x3½			890		
Reliance	44-R	2	144 x38	78	56	1650	C.S.	Own	Sq	1¾	W	R	S	32x3½			805		
Rogers Bros	2-Std	2	144 x40	96		1750	C.S.		Rec	1¾x2¾	W	R	S	34x3			850		
Trailmobile	K	2	144 x39	88	59½	2000	C.S.	Own	Rec	2x3¼&2x3	W	R	S	36x4			1570	1659	
Utility	D	2	144 x37	80	58	2000	I.S.		Sq	2	W or S	R		36x3½	144x 72	1200	900	1050	S.
Troy	256R	2½	142 x34	83	56	2540	R.S.		I	2¼x3⅜	W	R	S	36x4	147x 76	1151	1175	1350	Exp.
Highway	B4	2½	144 x35	86	58	2050	C.S.	Tim	I		W	R	S	36x3½	141x 66	1500	785	980	S. or P.
Lee	*D2	2½	166 x33	120	60	2750	L.S.	Tim	I		W	R	S	36x4		1500	1250	1800	Dump
Troy	212-R	2½	142 x41½	83	63½	2635	R.S.		I	2¼x3⅜	W	R	S	36x4	147x 76	1151	1175	1350	Exp.
Warner	51	2½	144 x34¾	87¾	56		C.S.	Sheldon	I		W	R	S	36x4			1175		
Automotive		3	144 x36		60		P.S.		Rd	2	S	R	S	36x4	144x 36		1100		
Byron	R3	3	144 x36	96	58	3500	C.S.	Shuler	I	2x2¾	W	R	S	36x4	144x 72	1200	1145		
Detroit	D	3	144 x39¼	101	60	2540	C.S.		I		W	R	S	36x4	144x 72	1000	1275	1555	S. & R.
Fruehauf	C-430R	3	156 x72		60	3225	C.S.	Own	Sq	2	W	R	S	34x4	156x 72	275	1195	1375	S. & R.
Detroit	*D	3	144 x39¼	101	60		C.S.		I		W	R	S	36x4			1475		S. & R.
Lee	T3	3	144 x36	100	58	2500	C.S.	Tim	I		W	R	S	36x5	66	1600	1200	1395	S. or Exp.
Hesse	7	3	132 x42		60	2125	C.S.	Own	Rec		W	R	S	34x3					
Ohio	300F	3	171¾x73	91	58	2500	P.S.	Own	I	2¼x3	W	R	S	36x5			1145		
Reliance	46R	3	144 x38	78	56	2000	C.S.	Own	Sq	2¼	W	R	S	34x4			1023		
Rogers Bros	3-STG	3	168 x39¼	120			C.S.		Rec	2x2¾	W	R	S	36x5			975		
Utility	E	3	144 x37	80	58	2550	I.S.		Sq	2¼	W or S	R		36x4	144x 72	1250	1125	1285	S.
Arcadia	352	3½	180 x76	84	63	3850	C.S.	Own	I		W	T.R.	P.O.S.	36x5			1360		
Lee	*D-3	3½	166 x33	120	60	3150	L.&P.S.	Tim	I		W	R	S	36x5		1600	1475	2000	Dump
Trailmobile	L	3½	168 x39	88	66½	2600	C.S.	Own	Rec	2¼x3¼-2x3	W	R	S	36x5	Opt		1370	1659	
Highway	N4	4	144 x40	86	66½	2536	C.S.	Tim	I		W	R	S	36x4	66x144	1400	1075	1270	S. & P.
Lee	T4	4	168 x40	117	66	3050	C.S.	Tim	I		W	R	S	36x6	72	2000	1475	1710	S or Exp.
Reliance	48R	4	156 x38	90	56	2550	C.S.	Own	Sq	2⅜	W	R	S	34x5			1358		
Utility	E	4	144 x37	80	58	4000	I.S.		Sq	2½	W or S	R		36x5	144x 72	1300	1400	1575	S.
Lee	D-4	4½	195 x36	144	66	4050	L. & P.S.	Tim	I		W	R	S	36x6		2000	1675	2250	Dump
Arcadia	502	5	180 x85	84	68	5200	C.S.		I		W	T.R.	P.O.S.	36x6			1680		
Automotive		5	168 x36		66		P.S.		Rd	3	S	R	S	36x7	168x 36		1800		
Byron	R-5	5	168 x36	120	64	4650	C.S.	Shuler	I	2¼–3½	W	R	S	36x6	168x 78	1800	1650		
Detroit	D	5	168 x39¼	125	62	3300	C.S.		I		W	R	S	36x6	168x 72	1200	1685	2010	S. & R.
Detroit	*D	5	168 x39¼	125	62		C.S.		I		W	R	S	36x6			1925		S. & R.
Fruehauf	C-450-R	5	168 x84		66	3700	C.S.	Own	Sq	2½	W	R	S	36x7	168x 84	325	1695	1875	S. & R.
Hesse	6	5	144 x42		60	3050	C.S.	Own	Rec		W	R	S	36x6					
Lee	T5	5	168 x40	117	66	3350	C.S.	Tim	I		W	R	S	36x7	72	2300	1575	1810	S. or Exp.
Ohio	500F	5	173½x84	90½	68	3750	P.S.	Own	I	2½x4	W	R	S	36x6			1680		
Reliance	410R	5	156 x38	90	56	3000	C.S.	Own	Sq	2½	W	R	S	36x6			1529		
Rogers Bros	5FTG	5	168 x40	120		2985	C.S.		Rec	2¼x3	W	R	S	36x6			1500		
Trailmobile	M	5	168 x42	87	70	3300	C.S.	Own	Rec	2⅝x4½-2x3	W	R	S	36x7	Opt		1850		
Troy	512R	5	142 x41½	83	65⅝	4295	R.S.		I	2¾x4	W	R	S	36x7	147x 76	1151	1750	1935	Exp.
Utility	G	5	144 x37	80	58	4500	I.S.		Sq	2½	W or S	R		36x6	144x 72	1350	1550	1725	S.
Warner	52	5	144 x35	93¼	56		C.S.	Sheldon	I		W	R	S	36x6			1690		
Highway	P4	6	144 x40¾	86	68¾	3496	C.S.	Tim	I		W	R	S	36x6	66x144	1800	1395	1590	S. & P.
Highway	L4	6	144 x28	86	56	3356	C.S.	Tim	I		W	R	S	36x6	66x144	1800	1395	1590	S. & P.
Lee	D-6	6	180 x40	156	66	5100	L.S.	Tim	I		W	R	S	36x7		2500	1875	2500	Dump
Automotive		7	168 x36		66		P.S.		Rd	3	S	R	S	36x7	168x 36		1800		
Detroit	D	7	168 x38	116	63	3950	C.S.		I		W	R	S	36x7			2000		
Lee	T-7	7	168 x40	117	66		C.S.	Tim	I		W	R	S	36x8	78	2600	1850	2085	S. or Exp.
Warner	54	7	156 x37	98	64		C.S.	Sheldon	I		W	R	S	36x7			1950		
Automotive		7½					P.S.		Rd	3½	S	R					1250		
Rogers Bros	10STG	10	192 x40	144		4900	C.S.		Rec	2¾x4	W	R	S	36x5D			2200		
Automotive		12½	168 x36		72		P.S.		Rd	3½F., 4R.	S	R	S	36x10	168x 36		2500		
Automotive		15					P.S.		Rd	4	S	R					1750		
Automotive		20					P.S.		Rd	4½	S	R	S				3500		

EXPLANATION OF ABBREVIATIONS.
Figures represent column numbers.

1 *—Drop Frames
3 *—Body Dimension.

7 R-S—Rolled Steel. C-S—Channel Steel. L-S—Angle Steel. I-S—I-Beam Steel. P-S—Pressed Steel.

9 Rec—Rectangle.
12 T-R—Taper Roller
13 P-O-S—Pressed on Solid.

19 F-B—Flare Board
Bol—Bolster
S—Stake.
Exp—Express.
P—Platform. R—Rack.

4-Wheel Non-Reversible Trailers, by Capacities

Trade Name	Model	Capacity (Tons)	Length and Width (Frame)	Wheelbase (In.)	Tread (In.)	Chassis Weight (Lb.)	Frame Material	AXLES			WHEELS		TIRES		BODY		PRICE		Body Type
								Make	Section	Size	Material	Bearings	Type	Size	Size (In.)	Weight (Lb.)	Chassis	With Body	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Hesse	110B	5/8	90x40	.....	56	.....	.....	Own	.....	1 3/16	W	B	P. or S	30x3–28x2	90x 40	.....	.....	.....	Exp.
Miami	1	5/8	96x38	70	56	.....	W	Tim	Sq	1 3/16	W	R	S	1¼ or 1¾	96x 38	.....	.....	.....	.....
Miami	5	5/8	96x38	70	56	.....	C.S.	Tim	Sq	1 3/16	W	R	S	1¼ or 1¾	96x 38	.....	.....	.....	.....
Trailmobile	A	5/8	94x37	62	56	512	L.S.	Own	L.S	1½	W	R	S	32x1¾	89x 40	.....	$284	$332	Exp. or S.
Miami	3	¾	96x40½	70	56	.....	C.S.	Tim	Sq	1¼	W	R	S	1¼ or 1¾	96x 42	.....	.....	.....	.....
Miami	4	¾	114x42	70	56	.....	C.S.	Tim	.....	1¼	W	R	S	1¼ or 1¾	114x 42	.....	.....	.....	.....
Miami	6	¾	104x38	70	56	.....	W	Tim	Sq	1¼	W	R	S	1¼ or 1¾	104x 38	.....	.....	.....	.....
Miami	7	¾	102x42	74	56	.....	W	Tim	Sq	1 3/8	W	R	S	1¼ or 1¾	102x 42	.....	.....	.....	.....
Trailmobile	B	¾	94x37	62	56	552	L.S.	Own	L.S	1½	W	R	S	32x2	89x 40	.....	341	388	Exp. or S.
Arcadia	100	1	144x66	68	58	975	C.S.	Own	F.,I;R.,Sq.	1¾x2¼– 1¾	W	T.R.	P	30x3½	.....	.....	350	.....	.....
Hi-Speed	20	1	.....	72	56	500	W	.....	F.,I;R.,S.	1 1/16–1¼	W	B	P	30x3	108x 37	210	250	290	Exp.
Miami	10	1	108x40	76	56	.....	W	Tim	Sq	1 3/8	W	R	S	1¼ or 1¾	114x42	.....	.....	.....	.....
Reliance	42	1	144x38	78	56	1200	C.S.	Own	Sq	1¾	W	R	S	32x3	.....	.....	550	.....	.....
Trailmobile	C	1	94x37	62	56	612	L.S.	Own	L.S	2	W	R	S	32x2	85x 40	.....	363	416	Exp. or S.
Utility	C	1	144x37	80	58	2500	I. S.	.....	Sq	2	W.or S	R	.....	34x3	61x144	1000	550	675	S.
Highway	A4	1½	144x35	86	56	1750	C.S.	Shuler	I.S.	.....	W	R	S	32x3½	66x144	1200	575	770	S.
Miami	12	1½	116x38	84	56	.....	C.S.	Tim	Sq	1 5/8	W	R	S	2	138x 42	.....	.....	.....	.....
Trailmobile	D	1½	120x37	74	56	1085	C.S.	Own	F.,Sq.;R.,I.	1 3/8–2 1/16	W	R	S	32x3	126x 42	.....	610	780	Exp. or S.
Warner	50	1½	132x31½	78	56	2104	C.S.	Sheldon	I.S.	.....	W	R	S	36x3½	.....	.....	750	.....	.....
Automotive	.....	2	144x36	.....	60	.....	P.S.	.....	Rd	2	S	R	S	36x3½&4	144x 36	.....	950	.....	.....
Continental	2-ton	2–3	144x60	78	56	.....	W	.....	Sq	1 7/8	W	R	S	34x4	.....	.....	.....	800	S. & R.
Graham Bros	.....	2	144x60	100	56	.....	C.S.&W.	Hess	Rec	2¼x1¾	W	R	S	32x3½	144x 60	.....	.....	400	S. & R.
Reliance	44	2	144x38	78	56	1650	C.S.	Own	Sq	2	W	R	S	32x3½	.....	.....	700	.....	.....
Rogers Bros	2NR	2	144x40	96	.....	1550	C.S.	.....	I.&Sq	1¾x2¾	W	R	S	34x3	.....	.....	650	.....	.....
Trailmobile	E	2	144x39	88	59½	1760	C.S.	Own	F.,I;R.,Rec	2x3¼– 1½x2¼	W	R	S	36x4	.....	.....	935	.....	Exp.
Utility	D	2	144x37	80	58	3050	I. S.	.....	Sq	2	W.orS.	R	.....	36x3½	72x144	1200	750	900	S.
Watson	Platform	2	.....	87	58	.....	L.S.	Tim	Sq	F.,2;R.,2¼	W	R	S	36x4	144x 60	.....	.....	.....	S.
Warner	51	2½	144x34¾	87¾	56	2528	C.S.	Sheldon	I	.....	W	R	S	36x4	.....	.....	1050	.....	.....
Automotive	.....	3	144x36	.....	60	.....	P.S.	.....	Rd	F.,2;R.,2½	S	R	S	36x4&5	144x 36	.....	1100	.....	.....
Continental	3-ton	3–4½	168x72	96	56	.....	W	.....	Sq	2¼	W	R	S	34x4	.....	.....	.....	1100	S. & R.
Miami	14	3	138x39	90	56	.....	C.S.	Tim	Sq	2¼	W	R	S	36x5	150x 42	.....	.....	.....	.....
Reliance	46	3	144x38	78	56	2000	C.S.	Own	Sq	2¼	W	R	S	34x4	.....	.....	890	.....	.....
Reliance*	46D	3	144x38	78	56	.....	C.S.	Own	Sq	2¼	W	R	S	34x4	.....	.....	.....	.....	.....
Rogers Bros	3NR	3	168x39¼	120	.....	.....	C.S.	.....	I. & Sq	2x2¼	W	R	S	36x5	.....	.....	800	.....	.....
Utility	E	3	144x37	80	58	3650	I. S.	.....	Sq	2¼	W	R	.....	36x4	72x144	1250	950	1110	S.
Watson	Platform	3	.....	115	60	.....	L.S.	Tim	Sq	F2¼;R2½	W	R	S	36x4–36x5	168x 66	.....	.....	.....	S.
Trailmobile	F	3½	144x39	88	66½	2450	C.S.	Own	Rec	F.2¼x3½ R.1¾x2¾	W	R	S	36x5	.....	.....	1270	.....	.....
Reliance	48	4	156x38	90	56	2550	C.S.	Own	Sq	2⅜	W	R	S	34x5	.....	.....	1180	.....	.....
Utility	F	4	144x37	80	58	3850	I.S.	.....	Sq	2½	W.orS.	R	.....	36x5	72x144	1300	1200	1375	S.
Automotive	.....	5	168x36	.....	66	.....	P.S.	.....	Rd	F.2½;R.3	S	R	S	36x6–40x7	168x 36	.....	1600	.....	.....
Continental	5-ton	5–7	192x78	108	62	.....	W	.....	Sq	2½	W	R	S	36x6	.....	.....	.....	1500	S. & R.
Reliance	410	5	156x38	90	56	3000	C.S.	Own	Sq	2½	W	R	S	36x6	.....	.....	1330	.....	.....
Reliance*	410D	5	156x38	90	56	.....	C.S.	Own	Sq	2½	W	R	S	36x6	.....	.....	.....	.....	.....
Rogers Bros	5NR	5	168x40	120	.....	2680	C.S.	.....	I. & Rec	2¼x3	W	R	S	36x6	.....	.....	1100	.....	.....
Trailmobile	G	5	144x42	87	70	.....	C.S.	Own	I. Rd	F.2 5/16x4¼ R.2x3	W	R	S	36x7	.....	.....	1065	1350	N. Y.
Utility	G	5	144x37	.....	.....	.....	I. S.	.....	Sq	2½	W	R	.....	36x6	72x144	1350	1350	1525	S.
Warner	52	5	144x35	93¼	56	3538	C.S.	Sheldon	I	.....	W	R	S	36x6	.....	.....	1550	.....	.....
Watson	Plat	5	.....	115	60	.....	L.S.	Tim	Sq	F.2½,R2¾	W	R	S	36x6–36x7	168x 66	.....	.....	.....	S.
Automotive	.....	7	168x36	.....	66	.....	P.S.	.....	Rd	F.3;R.3	S	R	S	36x7–40x8	168x 36	.....	1800	.....	.....
Continental	7-ton	7–10	192x84	108	62	.....	W	.....	Sq	2¾	W	R	S	36x7	.....	.....	.....	1950	S. & R.
Warner	54	7	156x37	98	64	4336	C.S.	Sheldon	I	.....	W	R	S	36x7	.....	.....	1790	.....	.....
Rogers Bros	NR	7½	192x40	144	.....	3850	C.S.	.....	I. & Rec	2¼x3½	W	R	S	36x4D	.....	.....	1400	.....	.....
Automotive	.....	10	168x36	.....	72	.....	P.S.	.....	Rd	3	S	R	S	36x8–40x10	168x 36	.....	2100	.....	.....
Continental	10-ton	10–15	192x84	108	62	.....	W	.....	Sq	.....	W	R	.....	.....	.....	.....	.....	.....	S. & R.
Rogers Bros	10NR	10	192x40	144	.....	4500	C.S.	.....	I. & Rec	2¾x4	W	R	S	36x5D	.....	.....	1800	.....	.....
Automotive	.....	15	168x36	.....	72	.....	P.S.	.....	Rd	F.3½;R.4	S	R	S	40x14	168x36	.....	2750	.....	.....

EXPLANATION OF ABBREVIATIONS.
Figures represent column numbers.
*—Drop Frame.

7 C-S—Channel Steel.
I-S—I-Beam Steel
L-S—Angle Steel
W-Wood
P-S—Pressed Steel

9 Rec—Rectangle
12 T-R—Taper Roller

19 Exp—Express
S—Stake
R—Rack

Two-Wheel Trailers, by Capacities

Trade Name	Model	Capacity (Tons)	Length and Width	Tread	Frame Material	AXLES			WHEELS		TIRES		Chassis Prices
						Make	Section	Size	Material	Bearings	Type	Size	
	1	2	3	4	5	6	7	8	9	10	11	12	13
Marx	B	⅜	72 x48	56	W	Own	Sq	1¼	W	B	P	30x3	
Marx	C	⅜	72 x48	56	W	Own	Sq	1¼	W	B	P	30x3	
Behlen	A	⅜	85 x44½		W	Sheldon	Sq	1¼	W	Ford	S	1¼	
Behlen	B	⅜	78 x48		W	Sheldon	Sq	1¼	W	Ford	S or P	1¼ or 3	
Defiance	1	⅜	72 x42	56 or 62		Concord	Sq	1¼	W	Plain	S	34x1¼	
Defiance	2	⅜	72 x42	56 or 62		Concord	Sq	1¼	W	Plain	S	34x1¼	
Defiance	3	⅜	72 x42	56 or 62		Timken	Sq	1¼	W	R	S	34x1¼	
Defiance	4	⅜	84 x42	56 or 62		Timken	Sq	1¼	W	R	S	34	
Defiance	5	⅜	78–96x42	56 or 62		Long Dis		1¼–1¾	W	B. & R	S	34x1¼–1¾	
Hesse	15B	⅜	72 x40	56		Own	Sq	1¼	W	B	S or P	28x2–30x3	
Hopp		⅜		56		Long Dis	Sq	1⅜	W		S	36	
Jackson	8	⅜	70 x42	56	W		Sq	1¼	W	B	S or C	1¾ or 30x3	
Lyons		⅜						1¼	W	B	P	30x3	
Miami	101	⅜		56	C.S	Timken	Sq	1⅜	W	R	S	1¼ or 1¾	
Shaver	10	⅜			L.S			1⅛	W	R. or B	S	30x1¾	
Standard	D-5	⅜	60 x42	56	W	Liggett	Sq	1¼	W	B	S	32x1¼	
Utility	X	⅜	58½x45½	56	L.S		Sq	1⅛	W			28x2	
Auto Kamp	H-5	½	84 x60	56 or 60	W	Own	Rd	1⅜	W	B. or R	S or P	32x2 or 30x3	$122½
Cross	A	½	72 x48	56	W		Rd	1½	W	B	P	30x3	
Curtis	1	½									S	34	
Holland	C	½											105
Jackson	10	½	70 x42	56	W		Sq	1¼	W	B	S	1¾	
Nepessing	18	½		56	W. & S	Own	Sq	1¼	W	Plain	S	1½	
Nepessing	19	½		56	W. & S	Own	Sq	1¼	W	Plain	S	1⅝	
Nepessing	20	½		56	W. & S	Own	Sq	1¼	W	Plain	P	30x3	
Nepessing	21	½		56	W. & S	Own	Sq	1½	W	B	S	30x2	
Rogers Bros	B	½	72 x46		C.S		Sq	1¼	W	B	S	32x1¾	
Shaver	10	½			L.S			1¼	W	R. or B	S	30x1¾	
Standard	C6	½	72 x46	56	W	Liggett	Sq	1½	W	R	S	32x1¾	
Standard	C8	½	96 x46	56	W	Liggett	Sq	1½	W	R	S	32x1¾	
Utility	O	½	72½x45½	56	L.S		Sq	1¼	W	R		28x2	
Hesse	19	⅝	96 x40	56	C.S	Own	Sq	1½	W	B	S	32x3	
Jackson	12	⅝	86 x42	56	W		Sq	1¼	W	B	S	1¾	
Utility	A Std	⅝	72½x45½	56	L.S		Sq	1¼	W	R		32x2	
Marx	D	½–¾	84 x48	56	L.S	Own	Sq	1½	W	R	P. or S	30x3½ or 32x2	
Highway	A	¾	84 x48	56		Liggett	Sq	1¼	W	B	P	30x3	
Hoof	PL	¾		62			Rd	1½	W	B	P	30x3	
Jackson	15	¾	86 x42	56	W		Sq	1¾	W	B	S or C	1¾ or 3½x32	
Jackson	15A	¾	86 x42	56	W		Sq	1¾	W	B	S or C	1¾	
Standard	B6	¾	72 x46	56	W	Liggett	Sq	1½	W	R	S	32x2	
Standard	B8	¾	96 x49	56	W	Liggett	Sq	1½	W	R	S	32x2	
Utility	A Spec	¾	72½x45½	56	L.S		Sq	1½	W	R		34x3	
Warner	K21	¾	68 x43	56	W	Own	Rd		W	R	S	36x3½	
Automotive		1			P.S		Rd	2	S	R	S	36x3½	400
Curtis	B 1919	1											
Highway	B	1	96 x48	56	W	Liggett	Sq	1½	W	R	S	32x2	
Hoof	H2	1		62			Sq	1¼	W	B	S	36x1¼	
Hoof	H3	1		62	W		Rd	1½	W	B	S	30x1¾	
Hoof	H4	1		62	W		Sq	1¼	W	B	S	34x1¼	
Jackson	20	1	86 x42	56	W		Sq	1¾	W	B	S or C	1¾	
Martin	Flat	1			P.S	Own	Sq		W	F.Bu			
Miami	110	1	116 x38	56	C.S	Timken	Sq	1⅝	W	R	S	2	
Miami	112	1		56	L.S	Timken	Sq	1⅝	W	R	S	2	
Rogers Bros	A	1	96 x46				Sq	1½	W	R	S	32x2	
Rogers Bros	IM	1	72 x46	56			Sq	1½	W	R	S	32x2	
Utility	Spec	1	94½x45½	56	L.S		Sq	1¾	W	R		34x3	
Utility	B	1	94½x45½	56	L.S		Sq	1¾	W	R		34x3	
Utility	BB	1	96 x47	58	L.S		Sq	1¾	W	R		34x3	
Utility	Lum	1	96 x47	58	L.S		Sq	1¾	W	R		34x3	
Wentworth & Irwin	20	1			C.S		Sq	2	W		S	30x3½	375
Curtis	C 1920	1¼									F	30x3	
Warner	G-31	1¼	82 x45	56	W	Own	Rd		W	R	S	34x4½	
Curtis	H-1919	1½									P	30x3	
Hoof	H5	1½		62	W		Sq	1¼	W	B	S	34x1¼	
Martin	Flat	1½			P.S	Own	Sq		W	F.Bu			
Utility	BB	1½	96 x47	58	L.S		Sq	2	W	R		36x3½	
Utility	Lum	1½	96 x47	58	L.S		Sq	2	W	R		36x3½	
Highway		1¾	106 x67	56	C.S	Shuler	Sq	2½	W	Tim	S	32x3½	235
Automotive		2			P.S		Rd	2½	S	R	S	36x5	550
Fruehauf	B-240	2–3	222 x74	60	C.S	Own	Sq	2⅝	W	R	S	36x5	615
Martin	Flat	2–3				Own	Sq		W	F.Bu			
Rogers Bros	2-M	2	72 x46	56			Rec	2¼x3	W	R	S	84x55	
Wentworth & Irwin	40	2			C.S		Sq	2¼	W	R	S	36x5	425
Rogers Bros	3-M	3	84 x55	65			Rec	2¼x3	W	R	S	36x7	
Wentworth & Irwin	60	3			C.S		Sq	2½	W	R	S	36x6	550
Martin	Flat	3–4½			P.S	Own	Sq		W	F.Bu			
Wentworth & Irwin	80	4			C.S		Sq	3½	W	R	S	36x8	1250
Fruehauf	B-240	4–5	216 x74	62	C.S	Own	Sq	2¾	W	R	S	36x7	790
Martin	Flat	4½–6			P.S	Own	Sq		W	F.Bu			
Fruehauf	B-260	6–8	216 x84	68	C.S	Own	Rec	2⅝x3⅝	W	R	S	40x10	1025
Fruehauf	B-2100	10–12	216 x84	72	C.S	Own	Rec	3x4½	W	R	S	40x14	1785

EXPLANATION OF ABBREVIATIONS.
Figures represent column numbers.

5 C-S—Channel Steel
L-S—Angle Steel
P-S—Pressed Steel

7 Rec—Rectangle
Rd—Round

10 F-Bu—Floating Bushing

Pole, Logging and Lumber Trailers, by Capacities

Trade Name	Model	Capacity (Tons)	Length	Tread (In.)	Frame Material	AXLES			WHEELS		TIRES		Chassis Price
						Make	Section	Size	Material	Bearings	Type	Size	
	1	2	3	4	5	6	7	8	9	10	11	12	13
Detroit	Pole	1	150	56	C.S.		Rec.	1¾x2¾	W	R.	S.	36x3	$475
For ythe	A.	1–1½		56	C.S.	Martin	Sq.	1¾	W	F.Bu.	S.	34x3½	400
Martin	Ext.	1	108			Own	Sq.	1½	W	F.Bu.	S.	46x1¾	
Rog rs Bros.	Log.	1	192	56	C.S.		Sq.	2	W	R.	S.	34x3	250
Rogers Bros.	1-O.	1	96				Sq.	1½	W	R.	S.	32x2	
Warner	D-5	1¼	49⅜	56	C.S.	Own	Rd.		W	R.	S.	36x3	400
Det oi	Pole	1½	150	56	C.S.		Rec.	2x3	W	R.	S.	36x4	535
Highway	R-2	1½–2	66	58	C.S.	Shuler	Sq.	2¼	W	Tim.	S.	36x4	550
King	P-15	1½			C.S.	Own	Rd.	2¼	W	R.	S.	36x4	
Martin	Ext.	1½				Own	Sq.	1¾	W	F.Bu.	S.	46x2	
Warner	D-10	1¾	49¾	56	C.S.	Own	Rd.		W	R.	S.	6x4	525
Arcadia	270	2	60	58	C.S.	Own	Sq.	2¼	W	T.R.	S.	32x3½	530
Automotive		2			P.S.		Rd.	2	S.	R.	S.	36x3½	800
Forsythe	B.	2–3		56	C.S.	Martin	Sq.	2	W	F.Bu.	S.	34x4	450
Hesse	70-P	2	78	60	C.S.	Own	Rec.		W	R.	S.	34x4	
Lee	P-2	2		56	C.S.	Tim	Rd.	3	W	R.	S.	36x4	475
Martin	Ext.	2–3				Own	Sq.	2	W	F.Bu.	S.	36x4	
Miami	122	2	108	56	C.S.	Tim	Sq.	1⅝	W	R.	S.	36x5	
Miami	123	2	108	56	C.S.	Tim	Sq.	2¼	W	R.	S.	36x5	
Reliance	24-L	2	60	56	C.S.	Own	Sq.	2¼	W	R.	S.	34x4	430
Rogers Bros.	Log.	2	264	56	C.S.		Sq.	2¼	W	R.	S.	36x5	350
Rogers Bros.	2-O.	2			C.S.		Rec.	2x2½	W	R.	S.	36x5	350
Texas	8002	2	72	56	C.S. & I.S.		Sq.	2⅛	W	R.	S.	34x4	675
Utility	Pole	2	60	58	I.S.		Sq.	2¼	W. or S.	R.		36x4	330
Utility	Lum.	2	44½	60	I.S.		Sq.	2½	W. or S.	R.		36x5	540
Watson	Ext.	2		58	L.S.	Tim	Sq.		W	R.	S.		
Byron	P2½	2½		56	C.S.	Shuler	Sq.	2¼	W	R.	S.	36x6	965
Detroit	Pole	2½	150	56	C.S.		Rec.	2x3	W	R.	S.	36x6	685
Troy Trailer	25 PT.	2½		56	R.S.	Shuler	Sq.	2¼	W	R.	S.	36x6	650
Warner	D-20	2¾	51	56	C.S.	Own	Rd.		W	R.	S.		660
Continental	3-ton	3–4½		56	C.S.		Sq.	2¼	W	R.	S.	34x4	550
Highway	S-2	3	68	58	C.S.	Tim	Sq.	2¾		Tim.	S.	36x6	695
Miami	124	3	108	56	C.S.	Tim	Sq.	2¾	W	R.	S.	36x6	
Rogers Bros.	Log.	3	264	56	C.S.		Rec.	2¼x3	W	R.	S.	36x7	550
Rogers Bros.	3-O.	3			C.S.		Rec.	2¼x3	W	R.	S.	36x6	450
Texas	8003	3	72	60	I.S. & C.S.		Sq.	2¼	W	R.	S.	36x5	765
Watson	Ext.	3		60	L.S.	Tim	Sq.		W	R.	S.		
King	P-25	3½			C.S.	Own	Sq.	2½	W	R.	S.	36x6	
Reliance	27L	3½	60	56	C.S.	Own	Sq.	2½	W	R.	S.	36x6	640
Samson	Pole	3½			I.S. or C.S.	Tim		2¼	W	R.	S.	36x6	500
Utility	Pole	3½	60	58	I.S.		Sq.	2½	W. or S.	R.		36x5	450
Utility	Lum.	3½	44½	60	I.S.		Sq.	3	W. or S.	R.		36x6	615
Arcadia	470	4	60	64	C.S.	Own	Sq.	2½	W	T.R.	P.O.S.	36x5	690
Byron	P4	4		64	C.S.	Shuler	Sq.	2¾	W	R.	S.	36x8	760
Detroit	Pole	4	150	56	C.S.		Rec.	2x3	W	R.	S.	36x8	790
Forsythe	C.	4		56	C.S.	Martin	Sq.	2	W	F.Bu.	S.	36x5	500
Hesse	60-P	4	78	60	C.S.	Own	Rec.		W	R.	S.	36x6	
Lee	P-4	4		60	C.S.	Tim	Rd.	3	W	R.	S.	36x6	
Martin	Ext.	4–6				Own	Sq.	2½	W	F.Bu.	S.	36x5	
Samson	Pole	4			I.S. & C.S.	Tim	Sq.	2¼	W	R.	S.	36x5	675
Automotive		5			P.S.		Rd.	2½	S.	R.	S.	36x6	1100
Continental	5-ton	5–7		62	C.S.		Sq.	2½	W	R.	S.	36x6	650
Highway	V-2	5	68	58	C.S.	Tim	Rec.	2¼x3⅝	W	Tim.	S.	36x8	995
King	P-50	5			C.S.	Own	Rec.	2½x4	W	R.	S.	36x7	
Reliance	210L	5	60	56	C.S.	Own	Sq.	3	W	R.	S.	36x8	755
Rogers Bros.	Log.	5	264	65	C.S.		Sq.	2¾	W	R.	S.	36x6D	900
Texas	8005	5	72	64	I.S. & C.S.		Sq.	2¾	W	R.	S.	36x7	890
Troy Trailer	50 PT.	5		64½	R.S.	Shuler	Sq.	2¼	W	R.	S.	36x5D	950
Utility	Pole	5	60	58	I.S.		Sq.	3	W. or S.	R.		36x6	520
Utility	Log.	5	49	64	I.S.		Sq.	3¾	W. or S.	R.		40x12	1360
Utility	Lum.	5	44½	60	I.S.		Sq.	3¼	W. or S.	R.		36x7	690
Watson	Ext.	5		60	L.S.	Tim	Sq.		W	R.	S.		
Wentworth & Irwin	100	5			C.S.		Sq.	3½	W	R.	S.	36x10	1375
Warner	D-30	5½	51	62	C.S.	Own	Rd.		W	R.	S.	36x8	975
Arcadia	670	6	60	70	C.S.	Own	Sq.	3	W	T.R.	P.O.S.	36x7	880
Lee	P-6	6		64½		Tim	Rd.	4½	W	R.	S.	36x5D	950
Miami	126	6	108	63	C.S.	Tim	Sq.	4	W	R.	S.	36x5D	
Samson		6			I.S.	Tim	Sq.	2¾	W	R.	S.	36x6	750
Wentworth & Irwin	120	6			C.S.		Sq.	3¾	W	R.	S.	40x12	1550
Automotive	Pole	7			P.S.		Rd.	3	S.	R.	S.	36x8	1500
Continental	7-ton	7–10		62	C.S.		Sq.	2¾	W	R.	S.	36x7	750
Rogers Bros.	Log.	7½	264	72	C.S.		Sq.	3¼	W	R.	S.	36x7D	1150
Martin	Ext.	8–10			P.S.	Own	Sq.	3½	W	F.Bu.	S.	36x6	
Wentworth & Irwin	170	8½			C.S.		Sq.	4	W	R.	S.	40x14	1650
Utility	Log.	9	49	64	I.S.		Sq.	4	W	R.		40x14	1550
Arcadia	970	10	60	70	C.S.	Own	Sq.	3½	W	T.R.	P.O.S.	36x6D	1295
Automotive	Pole	10			P.S.		Rd.	3½	S.	R.	S.	36x10	1500
Highway	Y-2	10	68	58	C.S.	Tim	Rec.	2¾x4⅜	W	Tim.	S.	36x6D	1535
Lee	P-10	10		64½	C.S.	Tim	Sq.	4½	W	R.	S.	40x7D	1475
Reliance	220L	10	84	56	C.S.	Own	Sq.	4½	W	R.	S.	40x12	1075
Rogers Bros.	Log.	10	264	72	C.S.		Sq.	4	W	R.	S.	36x8D	1500
Automotive	Pole	15			P.S.		Rd.	4	S.	R.	S.	40x14	

EXPLANATION OF ABBREVIATIONS.
Figures represent column numbers.

5 **C-S**—Channel Steel
I-S—I-Beam Steel
L-S—Angle Steel
P-S—Pressed Steel
R-S—Rolled Steel

7 **Rec**—Rectangle
Rd—Round
10 **F-Bu**—Floating Bushing
T-R—Taper Roller
11 **P-O-S**—Pressed on Solid

Semi-Trailers, by Capacities

Trade Name	Model	Capacity	Length and Width	Tread (In.)	Chassis Weight (Lb.)	Frame Material	Axle			Wheels		Tires		Body		Price		Body Type	Per Cent Load on S-T Axle
							Make	Section	Size	Material	Bearings	Type	Size	Size (In.)	Wgt. (lb.)	Chassis	With Body		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Hesse	100	⅜	36 x42*	56	370	C.S.	Own	Rec	1¼	W	B	S	28x2					Exp	
Hesse	90	¾	36 x42*	56	490	C.S.	Own	Rec	1½	W	R	S	30x2½					Exp	
Martin	Rear Assem.	1		56			Own	Sq	1½	W	F.Bu	S	46x1¾						75
Martin		1					Own	Sq	1½	W	F.Bu	S	46x1¾	108				Exp	75
Trailer-Truck	A	1	38	56	350	R.S. & W.	Special	Sq	1¼	W	B	P	30x3½			$165		Bol	60
Watson	Bot. Dump.	54 ft.	166 x73	58		L.S.	Tim	Sq	F2; R2¼	W	R	Steel	4	82½x 40½				Dump	
Hesse	80	1¼	42	56	765	C.S.	Own	Rec		W	R	S	32x3	42				Exp	
Watson	Bot. Dump.	81 ft.	191½x76	60		L.S.	Tim	Sq	F2½;R2½	W	R	Steel	4	82½x 40½				Dump	
King	SL-15	1½	144 x60	56		C.S.	Own	Rd	2¼	W	R	S	34x3½						
King	S-15	1½	144 x60	56	1820	C.S.	Own	Rd	2¼	W	R	S	34x3½	144 x 60	300	385	$435	S.&R	70
Martin		1½					Own	Sq	1½	W	F.Bu	S	46x1¾	144				Exp	75
Martin	Rear Assem.	1½		56		P.S.	Own	Sq	1¾	W	F.Bu	S	46x2					Pl	75
Arcadia	260	2	144 x46	58	2500	C.S.	Own	Sq	2¼	W	T.R	P.O.S.	32x3½			570			70
Automotive		2	144 x36	60		P.S.		Rd	2	S	R	S	36x4	144 x 36		650			60
Hesse	70-S	2	78	60	1290	C.S.	Own	Rec		W	R	S	34x4	78					
Highway	F-5	2–2½	144 x43	56	1073	C.S.	Shuler	Sq	2¼	W	Tim	S	32x3½	66 x144	900	445	640	S.&P	60
King	SL-2	2	144 x72	56		C.S.	Own	Rd	2¼	W	R	S	36x4						
King	S-12	2	144 x60	56	1920	C.S.	Own	Rd	2¼	W	R	S	36x4	144 x 60	300	485	550	S.&R	70
Knox	3B-TB	2	145½x71	56		L.S.	Own	Rd	2¾	W	R	S	34x3½	144 x 49			450	S	54
Lapeer	234	2	174 x42¼	56	1500	I.S.	Liggett	Rec	2x2½	W	R	S	34x4			695			70
Lee	S-2	2	144 x44	56	1500	C.S.	Tim	Rd	2½	W	R	S	36x4	60	1300	485	510	S	66
Martin		2–3		60		P.S.	Own	Sq	2¾	W	F.Bu	S	36x4					Pl	75
Reliance	24-S	2	144 x60	56	1250	C.S.	Own	Sq	2¼	W	R	S	34x4			560			70
Trailmobile	P	2	168 x39	59½	1000	C.S.	Own	I.S.	1½x2¼	W	R	S	36x4			635			66⅔
Universal		2½	72 x84	56	3800	C.S.	Own	Rec	2¼x4	S	R	S	36x8			1175		Bol	60
Warner	S-5	2½	144 x31½	56	1310	C.S.	Own	Rd		W	R	S	36x3			395			
Automotive		3	144 x36	60		P.S.		Rd	2½	S	R	S	36x5	144 x36		800			60
Columbia	3S	3				C.S.		Sq		W	R	S	34x5			550	610	S	
Continental	3-ton	3–4½				W		Sq	2¼	W	R	S	34x4				700	S.&R	70
Fruehauf	C-230	3	168 x66	60	1550	C.S.	Own	Sq	2	W	R	S	36x4	168 x 66	400	525	565	S.&R	70
Highway	G-5	3–4	168 x60	58	1616	C.S.	Tim	Sq	2½	W	Tim	S	36x5	168 x 66	1200	585	780	S.&P	60
King	S-3	3	174 x60	56	3000	C.S.	Own	Sq	2½	W	R	S	36x5	174 x 60	1200	660	750	S.&R	70
Knox	3A-TB	3	170 x73½	58		L.S.	Own	Rd	3¼	W	R	S	36x5	168 x 64		450	475	S	54
Lapeer	334	3	198 x42¼	60	1900	I.S.	Liggett	Rec	2¼x3	W	R	S	34x5			865			70
Lee	C-3	3	162 x42	56		C.S.	Tim	Rd	2½	W	R	S	36x4	60	1300	485	510	S	66
Lee	S-3	3	144 x44	56	1800	C.S.	Tim	Rd	3	W	R	S	36x5	66	1600	790	820	S	66
Rogers Bros	3-ST	3	168 x60		1350	C.S.		Rec	2x2½	W	R	S	36x5	168 x 60			600	Pl.&S	
Rogers Bros	3-SD	3	120 x42	65		C.S.		Rec	2x2½	W	R	S	36x5	120 x 42			600	S.Dump	
Trailer-Truck	C	3	38	56	650	R.S.&W.	Own	Sq	1¾	W	R	S	36x3			275		Bol	60
Trailmobile	S	3	168 x39	59	1350	C.S.	Own	I.S.	2x3	W	R	S	36x5			840			66
Troy Trailer	300 ST	3	168 x72	56	1760	R.S.	Shuler	Sq	2¼	W	R	S	36x6	168 x 72		750			75
Utility	S-3	3	144 x37 180 x37	58		I.S.		Sq	2¼	W or S	R		36x5	144 x 72	1250	560	720	S	66
Utility	L-3	3	144 x37	58		I.S.		Sq	2¼	W or S	R		36x5			580	90	R	50
Universal		3½	72 x96	66	5000	C.S.	Own	Rec	2¼x5	S	R	S	40x10			1400		Bol	60
Warner	S-7	3½	168 x34¾	56	1795	C.S.	Own	Rd		W	R	S	36x4			515			
Watson	Bot. Dump.	100 ft.	203½x76	60		L.S.	Tim	Sq	F2½;R3	W	R	Steel	5	95½x 40½				Dump	
Watson	Bot. Dump.	120 ft.	203½x76	60		L.S.	Tim	Sq	F2½;R3	W	R	Steel	5	95½x 40½				Dump	
Arcadia	460	4	144 x48	64	3000	C.S.	Own	Sq	2½	W	R	P.O.S.	36x5			735			70
Byron	84	4	144 x72	56	3500	C.S.	Shuler	Sq	2¼	W	R	S	36x6	144 x 72	1700	685			65
Fruehauf	C-240	4	168 x66	60	1900	C.S.	Own	Sq	2⅛	W	R	S	36x5	168 x 66	500	645	715	S.&R	70
Hesse	60-S	4	78	60	1675	C.S.	Own	Rec		W	R	S	36x6	76					
Martin	Rear Assem.	4–6		60			Own	Sq	2½	W	F.Bu	S	36x5						75
Reliance	28-S	4	168 x66	56	1900	C.S.	Own	Sq	2½	W	R	S	36x5			765			70
Samson		4	168			I.S.;C.S.	Tim	Sq	2¼	W	R	S	36x5	168 x 72		500	650	S	
Trailer-Truck	C2	4	38	56	850	R.S.&W.	Own	Sq	2	W	R	S	36x4			785		Bol	60
Automotive		5	168 x36	66		P.S.		Rd	3	S	R	S	40x7	168 x 36		1050			60
Continental	5-ton	5–7				W		Sq	2¼	W	R	S	36x6				1100	S.&R	70
Highway	H-5	5–7	168 x60	60	2100	C.S.	Tim	Rec	2¼x3⅝	W	R	S	36x7	168 x 66	1200	700	895	S	60
King	S-5	5	174 x72	60	3500	C.S.	Own	Rec	2½x4	W	R	S	36x7	175 x 72	1200	850	950	S.&R	70
King	SL-5	5	174 x72	60		C.S.	Own	Re	2½x4	W	R	S	36x7						
Knox	3C-TB	5	170 x79	58		L.S.	Own	Rd	4¼	W	R	S	36x6	168 x 72		700	750	S	54
Lapeer	534	5	198 x42¼	60	2200	I.S.	Liggett	Rec	2¼x3½	W	R	S	36x5			1045			70
Rogers Bros	5-ST	5	168 x72		1800	C.S.		Rec	2¼x3	W	R	S	36x7	168 x 60			800	P.&S	
Rogers Bros	5-SD	5	120 x42	65		C.S.		Rec	2¼x3	W	R	S	36x7	120 x 42			900	S.Dump	
Trailer-Truck	D	5	38	56	1050	R.S.&W.	Own	Rec	2x2½	W	R	S	36x5			495		Bol	60
Trailmobile	T	5	168 x41	62	1850	C.S.	Own	I.S.	2¾x3¾	W	R	S	36x7			650			66
Universal		5	72 x96	66	5400	C.S.	Own	Rec	2¼x5	S	R	S	40x12			1550		Bol	60
Utility	S-5	5	144 x37 180 x37	58		I.S.		Sq	2½	W or S	R		36x6	144 x 72		700	875	S	66
Utility	L-5	5	144 x37 180 x37	58		I.S.		Sq	2½	W or S	R		36x6			725		R	50
Warner	S-11	5½	180 x33	57½	2085	C.S.	Own	Rd				S	36x6			750			
Arcadia	660	6	168 x50	70	3800	C.S.	Own	Sq	3x3	W	T.R	P.O.S.	36x7			930			70
Byron	S-6	6	168 x78	64	4000	C.S.	Shuler	Sq	2¾	W	R	S	36x8	168 x 78	1800	965			65
Columbia	6S	6				C.S.		Sq		W	R	S	36x6			700	760	S	
Fruehauf	C-260	6	192 x72	62	2500	C.S.	Own	Sq	2⅝	W	R	S	36x7	168 x 72	600	795	875	S.&R	70
Lee	S-6	6	168 x45	60	2500	C.S.	Tim	Rd	3½	W	R	S	36x7	78	2500	1025	1060	S	66
Lee	C-6	6	168 x42	60		L.S.;P.S.	Tim	Rd	3-3¼	W	R	S	36x5	4 cu. yds.		1500	2000	Dump	75
Reliance	212S	6	192 x72	56	2700	C.S.	Own	Sq	3	W	R	S	36x7			990			70
Samson		6	192			I.&C.S.	Tim	Sq	2¼	W	R	S	36x5	168 x 72		600	750	S	
Troy Trailer	600 ST	6	192 x84	64½		R.S.	Shuler	Sq	3¼	W	R	S	36x5D	192 x 78		1200			75
Victor	O	6	192 x72	58½		P.S.		Sq	3	W	R	S	36x7	192 x 72			900	S.&R	66
Automotive		7	168 x36	66		P.S.		Rd	3	S	R	S	40x8	168 x 36		1200			60
Continental	7-ton	7–10				W		Sq	2¾	W	R	S	36x7				1250	S.&R	70
Trailmobile	V	7	168 x43	66	2200	C.S.	Own	I.S.	2¾x4¼	W	R	S	36x5D			1916			66
Utility	L-7	7	144 x37 180 x37	58		I.S.		Sq	3	W or S	R		36x7			900		R	50
Lapeer	734	7½	192 x42¼	64	2800	I.S.	Liggett	Rec	2¼x4	W	R	S	36x5D			1435			70
Rogers Bros	7½-ST	7½	192 x72		2600	C.S.		Rec	2¼x3½	W	R	S	36x6D	192 x 72			1100	Pl.&S	
Rogers Bros	7½-SD	7½	144 x42	65		C.S.		Rec	2¼x3½	W	R	S	36x6D	144 x 42			1200	Dump	
Fruehauf	C-280	8	216 x84	68	3200	C.S.	Own	Sq	2⅝	W	R	S	40x5D	216 x 84	650	1235	1320	S.&R	70
Highway	J-5	8–10	168 x60	60	2600	C.S.	Tim	Rec	2¾x4½	W	R	S	36x6	168 x 66	1200	965	1160	S.&P	60
Reliance	216-S	8	192 x72	64	3200	C.S.	Own	Sq	3½	W	R	S	36x10			1195			70
Martin	R. Assem.	8–10		60		P.S.	Own	Sq	3	W	F.Bu	S	36x6						75
Universal		8½	72 x96	72	6000	C.S.	Own	Rec	3x5	S	R	S	40x14			1700		Bol	60

Semi-Trailers, by Capacities—Continued

Trade Name	Model	Capacity	Length and Width	Tread (In.)	Chassis Weight (Lb.)	Frame Material	Axle			Wheels		Tires		Body		Price		Body Type	Per Cent Load on S-T Axle
							Make	Section	Size	Material	Bearings	Type	Size	Size (In.)	Wgt. (Lb.)	Chassis	With Body		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Arcadia	960	10	192 x52	70	5300	C.S.	Own	Sq.	3½	W	T.R.	P.O.S.	36x6D			$1290			70
Automotive		10	168 x36	72		P.S.		Rd.	4	S	R.	S.	40x10	168 x 36		1500			60
Continental	10-ton	10–15																S.&R.	70
Fruehauf	C-2100	10	216 x92	78	4125	C.S.	Own	Rec.	3x4½	W	R.	S.	40x6D	216 x 92	700	1525	$1650	S.&R.	70
Lee	S-10	10	192 x45	64½	3200	C.S.	Tim	Rd.	4½	W	R.	S.	40x6D	84	3000	1500	1545	S.	66
Reliance	220-S	10	192 x72	64	3600	C.S.	Own	Sq.	4	W	R.	S.	40x12			1475			70
Rogers Bros.	10-ST	10	216 x72		3000	C.S.		Rec.	2¾x4	W	R.	S.	36x7D	216 x 72			1400	Pl.&S.	
U ility	S-10	10	180 x37	60		I.S.		Sq.	3¾	W or S	R.		40x12	180 x 72	1650	1080	1290	S.	66
			240 x37										40x6D						
Warner	S-22	11	192 x36	62	2856	C.S.	Own	Rd.		W	R.	S.	36x8			1125			
Automotive		15	168 x36	72		P.S.		Rd.	4	S	R.	S	40x14	168 x 36		1500			60
Utility	S-15	15	240 x37	66		I.S.		Sq.	3¾	W or S	R.		40x14	240 x 84	1750	1200	1450	S.	66
													40x7D						

EXPLANATION OF ABBREVIATIONS.
Figures represent column numbers.

* (3)—Loading Space
6 C-S—Channel Steel
I-S—I-Beam Steel
L-S—Angle Steel
P-S—Pressed Steel
R-S—Rolled Steel

8 Rec—Rectangle
11 F-Bu—Floating Bushing
T-R—Taper Roller
12 P-O-S—Pressed-on Solid

18 Bol—Rolster
Exp—Express
P—Panel
Pl—Platform
R—Rack
S—Stake

Camp Trailers, by Capacities

Trade Name	Model	Capacity (Tons)	Length and Width	Tread	Frame Material	AXLES			WHEELS		TIRES		Chassis Price
						Make	Section	Size	Material	Bearings	Type	Size	
	1	2	3	4	5	6	7	8	9	10	11	12	13
Marx	A	⅜	84x48	56	W	Own	Sq.	1¼	W	B.	P.	30x3	
Reliance	20	⅜	72x48	56	L.S.	Own	Sq.	1¼	W	B.	S.	28x1¾	
Nepessing	24	½		56	W. & S.	Own	Sq.	1½	W	B.	S.	30x3	
Hesse	Camp		90x42	56		Own							
Hesse	Camp		90x42	56		Own							
Reliance	21	¾	84x48	56	L.S.	Own	Sq.	1½	W		S.	32x2½	
Curtis	Camp	1									P.	30x3	$175

EXPLANATION OF ABBREVIATIONS.
Figures represent column numbers.

5 L-S—Angle Steel
W—Wood

Motor Vehicles in Trinidad

ELEVEN hundred and thirty-two registered motor vehicles are reported to be in operation in Trinidad and Tobago, according to a report received by the Bureau of Foreign and Domestic Commerce. This represents a gain within a year, despite the fact that motor cars were on the restricted list of imports during the latter part of 1918. Indications for a large motor car business are good, due to the general prosperity of merchants and planters and the high prices being received for sugar, cocoa and cocoanuts, as well as a boom in the oil industry. Practically all the cars in the colony are of American manufacture, American cars being preferred because of price and because they are found more suitable to the highways, being of lighter weight and higher power than the European cars.

The roads of Trinidad are exceptionally good, and are paved with asphalt from the famous lake of asphalt on the island. There are approximately 600 miles of roads in Trinidad suitable for motor car traffic.

In answer to a letter from the Association of British Motor and Allied Manufacturers, Ltd., of England, recently, the Trinidad Automobile Association stated that a wheel track of 56 in. would be sufficient for the average automobile in the colony, that the minimum ground clearance of passenger cars and trucks should be not less than eight inches, that the wheel base on heavy touring and commercial cars should not exceed 125 in., and in the case of light cars should not be more than 108 in. Twenty feet was considered a normal radius for turning circle.

There has been an increasing demand in Trinidad for motor trucks, and the more such trucks come into the market, it is stated, with consequent demonstrations of their usefulness, the more are orders given for their importation from the United States.

The great difficulty at the present time is for local agents to secure deliveries from American manufacturers. There are between 40 and 50 trucks on order now in the United States from Trinidad, with delivery unaccomplished. When these arrive it will increase the number of trucks in operation in Trinidad to approximately 90. One-ton trucks are used for hauling cocoa from the estates to the railway stations and for store deliveries.

Trucks used for conveying cocoa have the bodies manufactured locally. Concerns engaged in production of oils are using 2½ to 3½-ton trucks and caterpillar tractors with trailers for hauling pipes and heavy machinery. One-ton trucks are selling in Trinidad for $2,900; 2-ton trucks for $3,500; 2½-ton trucks for $4,000 and 3-ton trucks for $4,500. The duty on motor cars and motor vehicles entering Trinidad is 8 per cent ad valorem British preferential tariff and 10 per cent ad valorem general tariff. Gasoline produced locally is used and sold by agreement among the producers for 48 cents per imperial gallon (1.2 gallons).

Trend of Airplane Design

This article is unsigned and we must trust to the knowledge of the writer to convince you that it is authoritative. Suffice to say that it is the product of a man who for several years has lived and worked only for the construction of better aircraft. Before that he was engaged in the same work for automobiles in the most practical way.

FOR the past year the aircraft industry has been striving to find some definite objective towards which to drive. The Armistice found the industry driving toward the production of war machines—and left it greatly inflated, with many highly specialized machines on hand that depressed the immediate development. Capital was too much concerned with immediate needs to subsidize flying as a commercial possibility. The visible progress, on the whole, that has been made has been theatrical rather than real. This theatrical phase, unfortunately, will last until flying has lost its novelty and is given opportunity to prove of economic value.

That the industry will prove of economic value is not to be doubted. It is based on an immutable economic law—*whatsoever shall shorten distance or save time shall prosper.* Too much is expected immediately of this war-nurtured infant, and in the light of what has been predicted, that which has been accomplished seems small.

However, real progress has been made in the art of flying. *And the real problem of the next period is the development of the art of flying.*

Safety, reliability, efficiency and speed are the objectives—and they will be reached not in one year, or in two, but they will be reached, and the aircraft industry will take its place with the motor car, the electrical, the railroad and the steamboat industries, for they too have been subject to the same economic law.

There will be, and are, gamblers, plungers, speculators, fanatics and notoriety seekers trying to realize on the development—that will do, and have done much to make flying regarded as a "game" and not as a serious business. While these will tend to retard the progress, the industry is too sound fundamentally to be permanently harmed.

Influence of Seaplane

It is logical that recently the greatest advance in the art of flying has been made in seaplane engineering. Land plane development had to come first and seaplane development lagged. Also, as the distances to be overcome are the greatest, competition from existing carriers is the least, flying conditions are somewhat more uniform, and especially prepared landing fields are no factor, that further development will take place in this field may be looked for with confidence in the immediate future.

The war seaplane made long patrols with heavy loads on regular schedules. Little fighting or maneuvering was necessary, and the work nearly paralleled that of a commercial carrier. Hence seaplanes were more immediately applicable to commercial work. It is for these reasons that the majority of airplane commercial carriers are starting along the coasts and waterways with seaplanes.

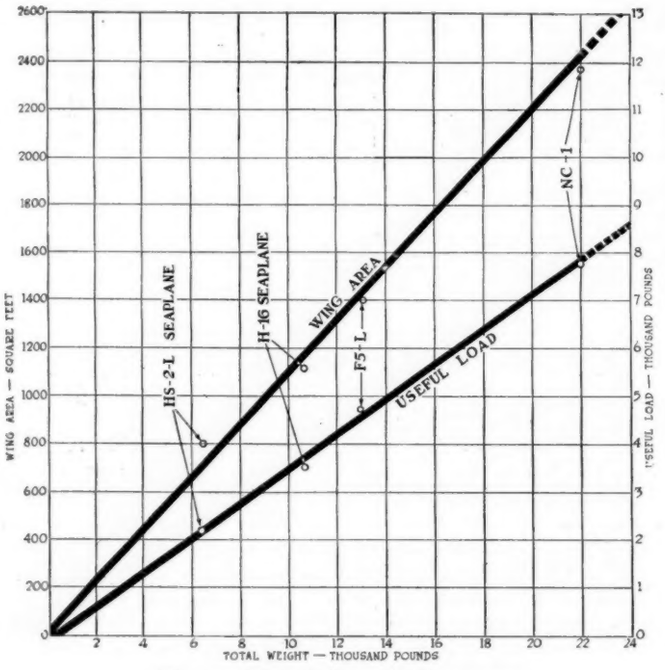


Fig. 1—Comparison of wing areas

The transatlantic flight of the N-C seaplanes was the result of consistent seaplane development—though forced years ahead of its time by the necessities of war. From it many valuable lessons in seaplane design have been learned and many basic requirements opened to investigation. The following are a few of the lessons learned:

1—By following the methods of the bridge designer in building up strength members, and distribution of material in proportion to stress, an increase in size does not materially affect the ratio between total and useful loads.

2—By reduction of the factors of safety, as rendered possible by the reduced maneuverability requirements of large planes, a decrease in the pro rata weight of structural members may be effected.

3—The use of multiple engines on large planes, in addition to increasing reliability, permits a decrease in the size of members by distribution of loads, and incorporation of engine mounting in the aerofoil rigging. This further decreases structural weight.

4—Practical proof on a large scale that once a satisfactory hull is developed for carrying a definite load under given conditions, the same design may be used for larger loads by merely expanding the original lines in the ratio of the cube roots of the displacement ratios.*

*From a paper by Commander H. C. Richardson, presented before the S. A. E., February, 1919.

A graphic comparison of the wing areas, useful loads and total weights of four seaplanes considered as marking distinct steps in seaplane development is shown in Fig. 1. It will be noted that the ratio in each case is approximately a straight line—disproving the theory that as the size of an airplane increases, the structural weight increases faster than the pro rata wing area. This straight line ratio is the result of careful design in line with points 1, 2 and 3 above noted.

Steps in Hull Development

The steps in the development of the hulls (or floats) of these four ships are shown in Fig. 2. The H. S. type hull was characterized by few longitudinals and external fins or sponsons extending part way back on the hull sides for the purpose of providing planing area on the water.

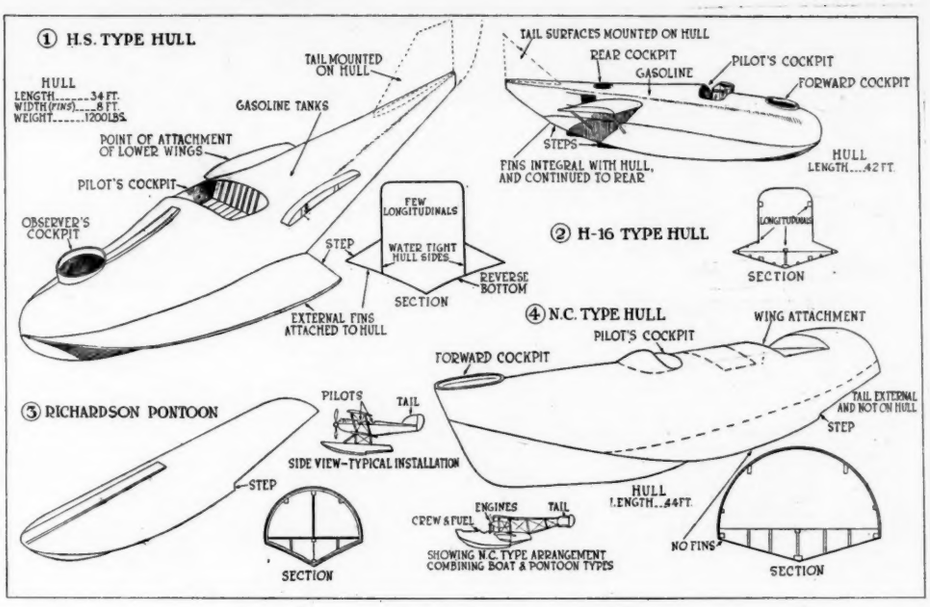


Fig. 2—Typical types of pontoons

The tail surfaces were mounted on the rear of the hull.

Large numbers of ships of this type were constructed, and gave good service, but because of the few longitudinals, and external fins, any marked increase in size, with consistent strength, was not possible without exceeding the weight factor of the hull.

The H-16 marks the next step. It will be noted that the fins extend to the rear, and join the hull sides, and throughout better streamlining is effected. This hull has continuous longerons extending from the front to the rear, providing the longitudinal stiffness necessary with the increased length and weight. Lateral stiffness is provided by small ribs running from the keel to the fin edges; by floor frames and by the bottom planking. The tail surfaces are mounted on these ships in a manner similar to those on the H. S. type, namely, on the rear end of the hull.

The F-5-L is similar to the H-16 in general arrangement and design, except that it is slightly larger, and modified in details only. One of these is that the ribs running from the keel to the fin edges are omitted, and the planking is allowed to carry the lateral load, and another that the top of the hull forms a continuous streamline from bow to stern.

No. 3, of Fig. 2, shows a typical Richardson pontoon, and its installation on a pontoon type seaplane. This pontoon may be considered the basis of the N-C type hull, shown in Fig. 2, No. 4, to which it bears a marked resemblance.

The characteristics of this type hull are in part (a) good planing action and sea-worthiness, (b) a form combining structural simplicity, strength and large displacement, and (c) good aerodynamic qualities.

The N-C type planes differ from the preceding seaplanes described in that the hull has no fin edges, and the tail surfaces are not mounted on the hull, but are carried on a superstructure. The general arrangement may be said to be a combination of the boat type seaplane and of the pontoon type. Because of the great increase in size the pontoon has room for fuel and crew, and to that extent is a boat, and the "fuselage" has become so large it is no longer advantageous to keep it a separate unit.

This briefly covers the more recent development of the seaplane, particularly as regards increase in size. Seaplanes larger than the N-C's can be built, and will be built, for here size is not limited by available landing fields, and increased size is advantageous.

The pontoon type seaplane, in spite of its better air qualities and greater safety in a crash, appears to be losing ground to the boat type seaplane in the smaller or sporting sizes. The small boat type seaplane is somewhat cheaper to construct, more sociable in seating arrangement, cleaner, more comfortable and quieter in flight, easier to handle on the water and to maintain. The Curtiss Seagull, the Vought V. E.-10 and the Aeromarine flying boat are examples of this type. The Vought, in general arrangement, is a small N-C plane.

The Small Boat Type

In spite of the above advantages of the small boat type seaplane, there would seem to be a good field for the single float pontoon type plane. The single pontoon type has exceptional air qualities; can be stunted, is fast, and because of the single pontoon (versus the double) can recover from a bad landing. Ordinarily it is a two purpose machine—that is, the pontoon may be removed, and landing gear installed, converting it into a land machine.

But the greatest advantage of the pontoon type seaplane lies in the inherent safety of the general arrangement—and it is toward safety that the next step in development should go. During the war the Navy used a large number of single float pontoon type seaplanes in training work, and few fatalities resulted from many crashes. In this plan the engine is in the nose, the pilots are in the rear, and the fuel tanks between, so that in a spill the shock does not come to the pilots until it has been partially absorbed by the propeller, the engine, the wings, the tanks, and the pontoon. This arrangement is safer than the reverse, which is characteristic of the boat type.

All governments at present seem greatly concerned with the development of airplanes for use in conjunction with the fleet—small planes that can take off from the decks, scout and if necessary direct gun fire, and return either to the deck, alongside, or to the shore.

The Aeromarine Company has developed an apparatus on a small seaplane for delivering mail to steamships

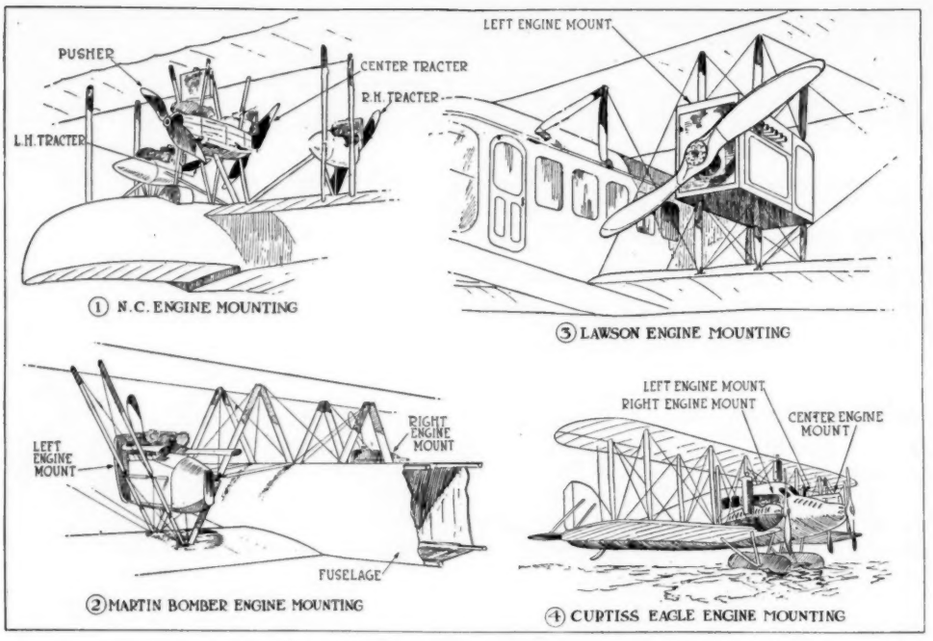


Fig 3—Engine mounting arrangements

at sea, and doubtless the development of war planes will be reflected in commercial lines. This development is indicated in the near future, for it is here that immediate advantages are to be obtained.

Engine Mountings

A comparison of the various types of engine mountings indicates a trend toward the use of two or more engines of small horsepower, rather than the use of a single engine of large horsepower. This is in no small part due to the small number of good engines from which to choose—a condition that hampers plane development to an appreciable extent.

The use of a limited number of multiple engines, however, has a marked advantage. Weight is distributed, and size of members decreased; controllability is bettered, and in case of failure of one power unit, flight may be maintained or prolonged on the remainder.

In Fig. 3 are shown several typical engine mounting arrangements. The feature of the N-C arrangement is a pusher and a tractor in tandem in the center. As originally flown, this type had a single tractor in the center, the pusher being added for the transatlantic flight. The arrangement, while ideal with respect to streamlining and centralization of weight, is dependent upon propeller efficiency.

The arrangement of the engines in the Martin Bomber may be said to be standard for planes of this type. In this particular case the installation is well worked out, and tied into the structure in a clean and efficient manner.

The Gallaudet mounting, shown in Fig. 3, No. 3, is unique, in that the engine is in the central portion of the fuselage, turning a pusher propeller, with the fuselage extending through and to the rear of the propeller. The advantage is that no more area is exposed than is absolutely necessary; and with the exception of the pontoon, that exposed is in line with the inefficient part of the propeller. Furthermore, this structure permits the fuselage to be carefully streamlined, and the center of resistance to be approximately in line with the center of thrust. Though partly dependent on other features of construction, the efficiency of this arrangement is indicated by the high speed of the machine.

This type of drive is quite complicated and expensive to construct, but possesses sufficient advantages to indicate further development.

Engine Arrangement

The engine arrangement of the Curtiss Eagle, Fig. 3, No. 4, indicates the trend towards several small power units on a large plane. There is much in favor of this design, chiefly in the line of inherent safety.

By this arrangement the dead weights are well forward, and the passengers and crew aft in position of greater safety, and being enclosed are not exposed to the propeller slip, and engine noise and oil. The maneuvering qualities, and possibilitity of prolonging flight in case of engine failure should be advantageous.

However, it is noted that the two inboard engines have been placed in so that their propellers rotate in the slip stream of the forward propeller, with a resulting periodic interference that is distinctly noticeable. That this condition may be overcome and the general arrangement maintained is an indicated immediate development.

In general arrangement of passenger carrying space, the Curtiss Eagle likewise indicates a general trend. On large multi-passenger ships, the enclosed fuselage and parlor car seating arrangement is common. To some extent closed cockpits are being used in the smaller ships, and it appears that more complete protection for the crew will be given careful attention in the immediate future.

It was stated that airplane development was hampered because of the few good engines available, hence new designs could be nothing but re-worked old ones. Engine designers, on the other hand, are hampered because the plane designers will not design for engines that have not proved their worth.

The Radial Engine

There are indications that designers would welcome a radial engine similar to the Salmson and Cosmos types of foreign practice. The Lawrence 3-cylinder radial air cooled engine, of this country, is of this type, but in its present sizes is too low powered for general use.

The advantages of this type are (a) ease of streamlining, (b) accessibility, (c) centralized weight, in addition to the advantages in the construction of the engine itself.

There has been one phase of airplane design that has been very nearly wiped out by flying experience gained during the war—and that is the attempt to get automatic stability. During the past period few devices have appeared to automatically fly a plane, and though one may appear from time to time, it is doubtful if any will be given serious consideration. Sufficient inherent stability can be incorporated in any design to render control by a competent pilot a matter of little concern.

The necessity of streamlining all exposed parts is recognized by all designers. However, the use of solid streamline wires instead of stranded cable and turnbuckles in interplane wiring has met considerable inertia.

From an aerodynamic and weight standpoint, the solid streamline wire is better, and in production the streamline wire has the advantage over the stranded cable.

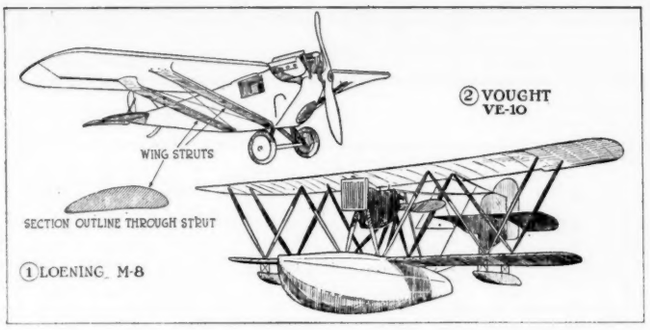


Fig. 4—The Loening monoplane, showing wing trussing system, whereby superstructure and wiring are eliminated. Note that the wing braces have a lifting section. These are in reality little wings

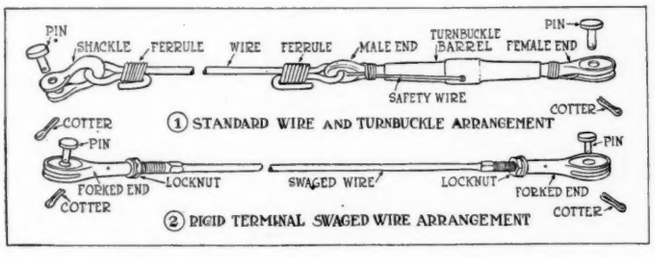


Fig. 5—The present tendency is toward the use of swaged wires for all internal wiring. Note the simplicity of the swaged wire installation as compared with the standard turnbuckle arrangement. It is also lighter, better adapted to quantity production and has 25 per cent less parts

However, due to the fact that the streamline wire may fail without warning, while a simple inspection shows the start of a failure in stranded wire, and partially because much of the streamline wire made to date is not of the material and workmanship the service merits, the prejudice of designers and pilots is against it.

Flying and Landing Wires Eliminated

At least two planes now available for civilian purchase have eliminated flying and landing wires. One, the Loening monoplane, shown in Fig. 4, accomplishes this by diagonal struts extending from the fuselage to the wings. These struts take both the flying and landing loads, the drift loads, however, being taken by the usual stagger wires.

The section of these diagonal struts is to be noted. It is in the form of a thick wing section, so that it is in effect a small wing, and is not entirely a parasite.

The second plane is the Vought V.E.-10 flying boat, shown also in Fig. 4. This is a biplane, with the upper wings having a greater span than the lower, and the struts diagonally placed from the hull out—the Warren type truss. These struts take both the flying and the landing loads—the former being taken by wires running through the centers of the struts. It is questionable, however, whether these wires are necessary. Stagger wires are used in the usual manner.

Standardizing Parts

Another healthy tendency in commercial plane development is that of standardizing parts. For example, on the Vought flying boat just mentioned, the upper and lower wings are identical except for fitting location. Hence a spare upper wing can be used on a lower replacement,

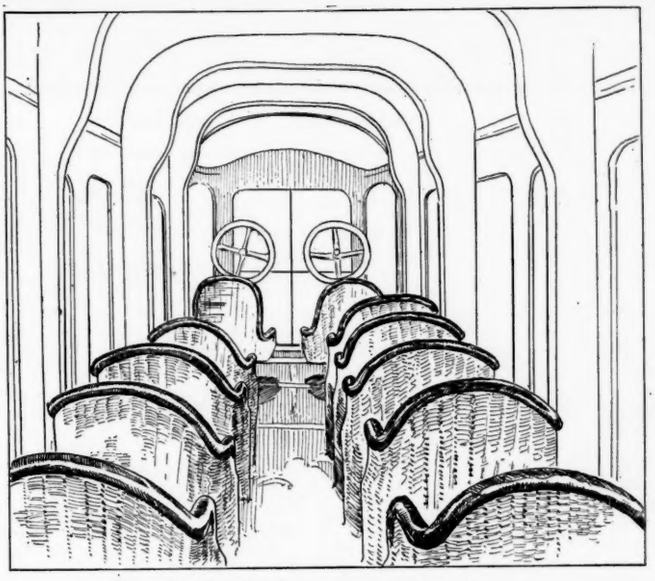


Fig. 6—Seating arrangement on Lawson

and vice versa. The fittings are also standardized, and because of the type of truss bracing, the wings may be set up by one with little experience. The ailerons are also interchangeable.

The Cato monoplane, a small ship recently announced, likewise has interchangeable parts—the right and left elevator and the rudder being interchangeable each for the other. The landing gear and other similar parts are understood to be interchangeable in a similar manner.

Commercial aviation will demand further development along the line of standardization, and it will apparently be one of the phases of the next period.

The excellent performance of the twin motored De Haviland mail plane, as reported by the Post Office Department, indicates the adaptability of a plane of this type to commercial uses. It differs from the large twin motored planes now in use chiefly in size, and has all of the benefits of that type of construction—namely, reliability, efficiency and safety. And because of its smaller size, it can land on a smaller field.

Industrial Safety Standards

A CONFERENCE on industrial safety codes was held at the Bureau of Standards in Washington on December 8, to consider the methods to be followed in the development of a series of national industrial safety codes, and their introduction into use. It is particularly desired to secure general co-operation in the preparation of these standards by those who will be concerned with their application and the work can be effective only when the efforts of all the interested parties are properly coordinated and a set of codes which can be applied uniformly in the different states is made available.

At this conference, arrangements were made for a joint Safety Code Committee on which the Bureau will be represented, to recommend a list of codes which should have first attention as well as the most suitable organizations for carrying out their compilation. As a result of a vote, it is evident that the general sentiment is in favor of having the Bureau, as well as engineering societies and other bodies, prepare standards in accordance with the methods of procedure of the American Engineering Standards Committee, and submit the resulting codes for the approval of that committee, in order to secure their more general acceptance and use.

TABLE I—American Com

(Compiled for Automotive Industries

Manufacturer and Model	GENERAL						POWER PLANT			WINGS AND TAIL DATA					
	Type	Use	Over-all Dimensions			Crew and Pass.	Engines		Total H.P.	Angle of Incidence		Chord		Span	
			Length, Ft.-In.	Height, Ft.-In.	Width, Ft.-In.		No.	Make		Upper	Lower	Upper, Ft.-In.	Lower, Ft.-In.	Upper, Ft.-In.	Lower Ft.-In.
Aeromarine 40-L	PB Boat	SP	28-11	12- 7	48- 6	2	1	Aeromarine	130	½°	2°	6- 3	6- 3	48- 6	37- 6
Ace	TB Land	SP	16- 1	....	28- 4	1	1	Ace	40	....	....	4- 6	4- 6	28- 4	....
Boeing C-1-F	TB Seaplane	SP	27- 0	13- 0	43- 0	2	1	Curtiss OXX-2	100	6½°	4°	5- 9	5- 9	43- 0	43- 0
Cato Monoplane	TM Land	SP	20-10	....	29- 0	1	1	Cato	72	4°	....	7- 0	....	29- 0	....
Curtiss Oriole	TB Land	P	25- 0	9- 5	36- 0	3	1	Curtiss K-6	150	....	....	5- 0	5- 0	36- 0	36- 0
Curtiss MF	PB Boat	SP	28-10	11-10	49-10	2	1	Curtiss	100	6°	6°	5- 0	5- 0	49-10	38- 7
Curtiss Eagle	TB Land	C	....	....	61- 4	8	3	Curtiss K-6	450	....	....	6- 9	6- 9	61- 4	61- 4
Curtiss HA Mailplane	TB Land	M	....	....	....	1	....	.....	....	....	....	....	....	....	....
Dayton-Wright T-4	TB Land	SP	17- 6	6- 1	19- 3	1	1	Specially designed	37	6°	6°	3- 4	3- 4	19- 3	19- 3
Dayton-Wright D-4-K	TB Land	P	30- 2	11- 9	42- 6	3	1	Liberty	420	3°	3°	5- 6	5- 6	42- 6	42- 6
Gallaudet E-L-2	FM Land	SP	18- 7	5- 0	33- 0	1	1	Indian Motorcycle	36	....	....	4- 6	....	33- 0	....
Gillespie C-E-3	TB Land	P	28- 0	9- 6	40- 0	3	1	Gillespie	171	3°	3°	6- 0	6- 0	40- 0	38- 0
Hild & Marshonet Sportplane	TB Land	SP	19- 0	7- 0	24- 0	1	1	Hild & Marshonet	20	4°	4°	5-0 to 3- 0	4-6 to 3- 0	24- 0	....
Jennings R. C. J. Junior	TB Land	SP	16- 3	8- 0	28- 0	1	1	R. C. J.	35	....	....	4- 0	....	28- 0	....
Jennings R. C. J. Sport	TB Land	SP	18-11	8- 1	28- 0	1	1	R. C. J.	35	4½°	4½°	4- 0	....	28- 0	....
Lawson C-2	TB Land	C	48- 0	15- 0	91- 0	28	2	Liberty-12	800	3½°	3½°	9-10	9-10	91- 0	91- 0
Lawson MT-2	TB Land	SP	25- 0	8- 0	39- 0	2	1	Hall-Scott	100	3°	3°	5- 2	5- 2	39- 0	36- 0
Lewis & Vought VE-7	TB Land	SP	22- 4	8- 7	34- 3	2	1	Hispano-Suiza	150	....	....	4- 7	4- 7	34- 3	34- 3
Lewis & Vought VE-10	FB Boat	SP	27- 0	10- 5	36- 0	3	1	Curtiss OX-5	90	4°	4°	5- 2	5- 2	36- 0	28- 5
Loening Kitten	TM Seaplane	SP	13-11	5- 0	18- 0	1	1	Lawrance 3-cyl	60	°	....	4- 0	....	22- 0	....
L-W-F H	TB Land	M or C	53-10	17- 6	105- 0	3	3	Liberty-12	1200	4½°	3½°	11- 0	11- 0	105- 0	105- 0
L-W-F J-1	TB Land	M	29-11	11- 6	54- 5	1	2	Hall-Scott L-6	400	3°	3°	5- 6	5- 6	54- 5	54- 5
Martin Mailplane	TB Land	M	46- 0	14- 7	71- 5	2	2	Liberty-12	800	2°	2°	7-11	7-11	71- 5	71- 5
Martin Transport	TB Land	C	46- 0	14- 7	71- 5	12	2	Liberty-12	800	2°	2°	7-11	7-11	71- 5	71- 5
V. E. Martin K-III	TB Land	SP	13- 4	7- 4	About 19- 0	1	1	A.B.C. Gnat	45	....	....	3- 6	3- 6	15- 0	17-11
Maryland Bellanca	TB Land	SP	17- 7	....	26- 0	1	1	Anzani	35	....	....	4- 0	2- 4	26- 0	20- 6
Lincoln Standard J-1	TB Land	SP	27- 0	11- 7	44- 7	3	1	Hispano-Suiza	150	....	....	6- 0	6- 0	44- 7	32- 7
Orenco C-4	Biplane Land	SP	20- 0	8- 7	30- 0	2	1	Le Rhone	80	2°	2°	4- 6	4- 6	30- 0	30- 0
Orenco F	Biplane Land	M or P	24-10	9- 0	38- 0	4	1	Hispano-Suiza	150	2°	2°	5- 0	5- 0	38- 0	38- 0
Orenco H-3	Biplane Land	C	36-	13- 0	56- 0	12	2	Hispano-Suiza	600	5°	3°	8- 0	6- 7	56- 0	42- 0
Orenco I	Biplane Land	P	25- 9	10- 3	38- 0	4	1	Hispano-Suiza	150	2°	2°	5- 6	5- 6	38- 0	28- 0
Packard 1-A	TB Land	SP	25- 0	8-11	37- 0	2	1	Packard, 8-cyl	160	....	....	....	....	37- 0	37- 0
Thomas-Morse S-6	TB Land	SP	20- 8	8-10	29- 0	2	1	Le Rhone	80	1°	1°	5- 6	5- 6	29- 0	29- 0
Thomas-Morse S-7	TB Land	SP	21- 6	9- 0	32- 0	2	1	Le Rhone	80	2¼°	1½°	5- 6	5- 6	32- 0	32- 0
Thomas-Morse MB-4	TFB Land	M	25- 5	11- 0	45- 6	2	2	Hispano-Suiza	600	+⅓°	−⅓°	8-10	8-10	45- 6	....
Whittemore-Hamm L-2	TB Land	SP	25- 6	....	36- 4	2	1	Curtiss	90	3°	3°	5- 6	5- 6	36- 4	30- 4
Wittemann-Lewis Twin Hydro	PB Seaplane	C or M	54- 0	....	100- 0	4	2	Hall-Scott L-6	400	4°	3½°	8-0 to 10- 0	8-0 to 10- 0	100- 0	71-
Wittemann-Lewis F-A-2	TB Land	C	35- 1	11- 9	52- 0	5	1	Liberty-12	330	3°	3°	6- 9	6- 9	52- 0	52- 0
White Sport Monoplane	TB Land	S	14- 0	....	23- 0	1	1	Indian or H-D Motorcycle	18	....	....	....	....	23- 0	....

KEY TO NOTATION USED ON SHEETS OF TABULATED DATA

A—Ambulance
AT—Australian trip machine
ASP—Anti-submarine patrol
B—Bombing
C—Commercial (passenger and freight)
DB—Day bombing
F—Fighting
FF—Fire fighting
G—General service (Military)
M—Mail carrier
O—Observation (Military)
P—Passenger
PB—Pusher biplane
PM—Pusher monoplane
PP—Police patrol
PT—Pusher triplane

Excepting where otherwise stated, all of the machines in the above table are either in production or are built to order.

mercial Airplanes—1919-1920

by Arch. & Don. R. Black)

WINGS AND TAIL DATA—*Continued*											WEIGHT IN LBS.					PERFORMANCE							
AREAS IN SQUARE FEET																		HIGH SPEED			CLIMB			
Wings and Tails	Ailerons	Stabilizer	Elevators	Vertical Fin	Rudder	Non-Skid Planes	Gap Ft.-In.	Stagger In.	Sweep-back	Dihe-dral	Empty	Gas and Oil	Useful Load	Total Gross	Useful per Cent Gross	Lb. / H.P.	Lb. / Sq. Ft.	M.P.H.	Altitude (Feet)	Low Speed, M.P.H.	Minutes	Feet	Service or Approx. Ceiling (Feet)	Range at High Speed (Miles)
504	58.0	39.0	25.6	15.0	17.0	..	6-6	8	....	2°	1,835	278	640	2,475	25.9	19.0	4.9	75.0	..	43.0	10.0	2,600	10,000	188
..	..	..	..	..	..	..	..	....	....	....	600	..	225	825	27.3	20.6	....	60.0	..	30.0	..	..	.....	.....
493	36.0	..	30.0	6.0	12.0	..	6-0	29½	....	1°	..	..	..	2,445	..	24.5	5.0	70.0	..	38.0	10.0	1,800	.....	175
186	23.8	15.5	13.8	4.5	6.9	..	..	....	5°	2°	474	80	253	726	34.9	10.1	3.9	68.0	..	25.0	10.0	4,500	12,000	.....
..	..	..	..	..	..	..	..	....	....	....	1,564	310	790	2,354	33.6	15.7	....	96.0	..	49.0	..	..	15,000	290
401	44.9	33.4	30.3	15.7	20.4	..	6-4	....	....	2°	1,832	262	600	2,432	25.0	24.3	6.1	69.0	..	45.0	21.0	5,000	.....	325
770	..	..	..	..	..	..	..	....	....	....	5,130	..	2320	7,450	31.2	16.5	9.7	107.0	..	55.0	10.0	4,075	.....	350
117	18.0	7.5	5.5	..	3.3	..	3-9 to 3-3	9	....	0° up. 3° low.	476	76	Approximately 236	712	33.1	19.2	6.1	81.0	..	38.0	10.0	3,000	.....	243
441	71.6	38.4	24.0	6.0	13.5	..	5-10	12	....	3°	2,400	550	1010	3,410	29.6	8.2	7.80	115.0	..	53.0	10.0	10,000	.....	.....
130	..	12.0	8.0	2.0	4.0	..	..	....	....	1°	600	55	Approximately 220	820	26.8	22.8	6.30	80.0	..	40.0	..	..	.....	160
450	43.0	38.0	28.0	5.5	14.0	..	6-6	16	....	2°	2,106	290	794	2,900	27.4	17.0	6.50	78.0	4,000	38.0	10.0	2,800	.....	234
160	13.0	6.0	11.0	3.0	6.0	..	..	40° to 12°	+ up. − low.	0° up. 6° low.	450	..	250	700	35.7	35.0	4.37	65.0	..	35.0	1.0	780	.....	.....
206	..	..	..	..	..	..	4-3	8	....	....	340	..	240	580	41.3	16.6	5.90	74.0	..	37.5	10.0	6,500	.....	296
206	..	20.0	16.0	2.5	6.5	..	4-3	8	....	3°	450	..	..	..	..	..	....	80.0	..	37.0	..	..	.....	.....
1707	130.0	115.0	100.0	25.0	45.0	..	9-4	....	3°	1½°	7,517	2410	6412	13,929	46.0	17.4	8.20	110.0	..	43.0	10.1	6,000	17,600	430
350	40.0	..	..	..	..	..	5-1	8	....	1°	1,200	..	700	1,900	36.8	19.0	5.40	90.0 90.0	10,000 ..	40.0	18.5 10.0	10,000 6,000	.....	.....
299	37.4	19.0	17.0	2.3	7.8	..	4-9	11°	....	1¼°	1,295	181	630	1,925	32.7	12.8	6.40	110.0	..	48.0	4.7	5,000	20,750	250
300	34.4	27.0	19.0	13.0	10.0	..	5-5	....	....	2°	1,330	125	620	1,950	31.8	21.7	6.50	103.5 78.0	10,000 ..	46.0	13.0 1.0	10,000 325	.....	200
72	11.0	.8	5.3	2.5	2.6	..	..	....	....	1°	360	64	224	584	38.2	10.6	8.10	100.0	..	50.0	10.0 10.0	2,650 7,000	.....	100
2200	200.0	174.4	83.2	28.0	78.9	..	11-0	....	....	0° up. 2° low.	12,400	4990	7600	20,000	38.0	16.6	9.10	110.0 109.0	.. 6,000	55.0	9.1 17.8	6,000 10,000	17,500	.....
546	70.6	38.4	24.0	6.0	33.5	..	5-6	12	....	3°	3,140	805	1660	4,800	34.6	12.0	8.80	107.0 104.0	.. 9,000	53.0	5.0 12.0	4,500 9,000	18,000	321
1080	130.0	62.3	43.2	17.6	32.9	..	8-6	....	....	....	5,835	1775	3665	9,500	38.6	11.9	8.80	115.0	..	55.0	25.0	10,000	15,000	460
1080	130.0	62.3	43.2	17.6	32.9	..	8-6	....	....	....	5,835	1775	3665	9,500	38.6	11.9	8.80	About 115.0	..	55.0	25.0	10,000	15,000	460
101	10.0	9.5	6.7	..	4.9	..	4-6	....	....	....	350	52	220	570	38.6	12.7	5.50	135.0 112.0	.. 10,000	..	3.0 6.0	5,000 10,000	.....	.....
150	..	..	..	..	..	..	..	....	....	....	400	..	375	775	48.4	22.1	5.20	85.0	..	34.0	1.0	820	.....	.....
444	54.0	23.7	22.0	3.7	10.0	..	5-11	12⅝	5°	3°	1,660	200	650	2,310	28.1	15.4	5.20	110.0	..	35.0	8.5 15.8	6,500 10,000	15,000	.....
249	31.2	16.8	13.8	3.8	6.7	..	4-6	15	....	....	985	110	585	1,570	37.3	19.6	6.30	95.0 88.0	.. 10,000	38.0 38.0	14.3 41.0	5,000 10,000	.....	214
335	41.3	26.7	21.6	4.3	9.6	..	5-0	12	....	1½°	1,477	250	955	2,432	39.3	16.2	7.20	100.0 88.0	.. 10,000	43.0	9.0 24.0	5,000 10,000	.....	290
680	68.5	33.3	34.0	11.0	32.2	..	7-0	5	....	....	3,530	1100	2470	6,000	41.2	10.0	8.80	140.0 124.0	.. 10,000	48.0 48.0	4.3 11.0	5,000 10,000	.....	422
317	30.0	24.0	22.0	21.0	12.0	..	5-9	....	....	0° up. 1½° low.	1,530	250	970	2,500	38.8	16.7	7.90	73.0 65.0	.. 10,000	42.0	11.0 26.0	5,000 10,000	.....	126
387	48.0	30.0	22.0	5.0	11.0	..	..	....	....	....	1,520	240	647	2,167	30.0	13.5	5.60	102.0 98.0	.. 10,000	..	7.5 18.1	5,000 10,000	.....	255
296	31.0	14.5	16.8	3.6	8.5	..	4-10	24⅝	....	2°	924	152	472	1,396	33.8	17.5	4.70	105.0	..	40.0	10.0	8,000	18,000	.....
350	49.0	14.5	16.8	3.6	8.5	..	4-6	23	....	0° up. 2¼° low.	1,005	155	475	1,480	32.1	18.5	4.30	97.0	..	38.0	10.0	6,500	.....	.....
645	44.0	16.0	34.0	4.0	22.0	..	6-3	....	....	2°	2,864	..	2700	5,564	48.5	8.2	8.70	Estim.	..	..	Esti	mated	.....	.....
..	..	..	..	..	..	..	5-6	....	....	0° up. 2½° low.	1,250	..	600	1,850	32.4	20.5	....	122.0	.. ..	.. ..	10.0 ..	9,000 ..	.....	.....
1454	..	..	108.0	7.5	22.0	..	8-0	....	....	1½°	7,525	3800	5225	12,750	41.0	31.9	8.77	85.0 70.0	.. 10,000	50.0	4.0 30.0	1,000 5,000	10,000	.....
639	84.8	44.0	21.0	7.5	11.0	..	6-0	....	....	3°	2,535	650	1505	4,040	37.2	12.3	6.30	100.0 90.0	.. 10,000	30.0	30.0	10,000	15,000	.....
..	..	..	..	..	..	..	..	....	....	....	200	..	190	390	48.7	21.6	....	50.0	..	..	..	..	....	.....

KEY TO NOTATION USED ON SHEETS OF TABULATED DATA

PQ—Pusher quadruplane
R—Reconnaissance
S—Scout
SP—Sport
SS—Ship scout
T—Training
TA—Transatlantic
TB—Tractor biplane
TPB—Tractor pusher biplane
TPT—Tractor pusher triplane
TF—Trench fighter
TM—Tractor monoplane
TP—Torpedo plane
TT—Tractor triplane
TQ—Tractor quadruplane

Excepting where otherwise stated, all of the machines in the above table are either in production or are built to order.

TABLE II—American Mil

(Compiled for Automotive Indus

Manufacturer and Model	GENERAL						POWER PLANT			WINGS AND TAIL DATA					
	Type	Use	Over-all Dimensions			Crew and Pass.	Engines		Total H.P.	Angle of Incidence		Chord		Span	
			Length, Ft.-In.	Height, Ft.-In.	Width, Ft.-In.		No.	Make		Upper	Lower	Upper, Ft.-In.	Lower, Ft.-In.	Upper, Ft.-In.	Lower, Ft.-In.
Aeromarine 40-L	PB Boat	T.	28–11	12– 7	48– 6	2	1	Aeromarine	130	3½°	2°	6– 3	6– 3	48– 6	37– 8
Boeing C-Hall-Scott	TB Seaplane	T.	27– 0	12– 7	43–10	2	1	Hall-Scott A-7-A	100	6½°	4°	5– 9	5– 9	43–10	43– 2
Christmas Bullet	TB Land	S.	21– 0	7– 6	28– 0	1	1	Liberty 6	185	3½°	3½°	5– 0	2– 6	28– 0	12– 0
Curtiss 18-B Hornet	TB Land	F.	23– 4	8–11	37– 6	2	1	Curtiss K-12	400	....	....	4– 6	4– 0	37– 6	37– 6
Curtiss 18-T	TT Land	F.	23– 3	9–10	31–11	2	1	Curtiss K-12	400	All	2½°	All	3–6	All	31–11
Curtiss NC-1	TB Boat	ASP	68– 4	24– 5	126– 0	5	3	Liberty-12	1080	3°	3°	12– 0	12– 0	126– 0	96– 0
Curtiss NC-4	TPB Boat	ASP & TA	68– 4	24– 5	126– 0	5	4	Liberty-12	1600	3°	3°	12– 0	12– 0	126– 0	96– 0
Curtiss JN-4-H	TB Land	T.	27– 1	9–11	43– 7	2	1	Hispano-Suiza	150	2°	2°	5– 0	5– 0	43– 7	33–11
Curtiss HS-2-L	PB Boat	ASP	38– 6	14– 7	74– 1	2	1	Liberty-12	330	5½°	5½°	6– 3	6– 3	74– 1	64– 2
Curtiss H-16	TB Boat	ASP	46– 2	17– 9	95– 0	4	2	Liberty-12	660	4°	4°	7– 1	7– 1	95– 0	68–11
Curtiss HA	TB Seaplane	F.	30– 9	10– 7	36– 0	2	1	Liberty-12	385	....	....	6– 0	6– 0	36– 0	36– 0
Curtiss N-9-H	TB Seaplane	T.	29–10	10–10	53– 4	2	1	Hispano-Suiza	150	2°	2°	5– 0	5– 0	53– 4	43– 0
Dayton-Wright DH-4	TB Land	F.	29–11	9– 8	42– 7	2	1	Liberty-12	400	3°	3°	5– 6	5– 6	42– 7	42– 7
Dayton-Wright T-4	TB Land	Despatch Carrier	17– 6	6– 1	19– 3	1	1	Specially designed	37	6°	6°	3– 4	3– 4	19– 3	19– 3
Gallaudet D-4	PB Seaplane	F.	33– 5	46– 5	46– 6	2	1	Liberty	330	2′–10″	2′–10″	7– 0	7– 0	46– 6	45– 0
Lawson MT-2	TB Land	T.	25– 0	8– 0	39– 0	2	1	Hall-Scott	100	3°	3°	5– 2	5– 2	39– 0	36– 0
Lewis & Vought VE-7	TB Land	T	22– 4	8– 7	34– 3	2	1	Hispano-Suiza	150	....	....	4– 7	4– 7	34– 3	34– 3
Loening Kitten	TM Seaplane	SS	13–11	5– 0	22– 0	1	1	Lawrance 3-cyl	60	4°	....	4– 0	....	22– 0	....
Loening Cat	TB Seaplane	SS	17– 4	6–10	25– 2	1	1	Lawrance 3-cyl	60	4°	....	5– 0	....	25– 2	....
Loening M-8	TM Land	F.	23– 9	6– 8	33– 4	2	1	Hispano-Suiza	300	2°	....	7– 0	....	33– 4	....
L-W-F G-2	TB Land	F.	29– 1	9– 9	42– 1	2	1	Liberty-12	435	1°	....	6– 8	6– 8	42– 1	38– 6
Martin Bomber	TB Land	B.	46– 0	14– 7	71– 5	3	2	Liberty-12	800	2°	2°	7–11	7–11	71– 5	71– 5
Martin Transport	TB Land	Milit. Trans.	46– 0	14– 7	71– 5	12	2	Liberty-12	800	2°	2°	7–11	7–11	71– 5	71– 5
Orenco B	Biplane Land	F.	18–10	7– 4	26– 0	1	1	Gnome	160	2°	1°	4– 0	3– 9	26– 0	23– 0
Orenco C	Biplane Land	T.	18–10	7– 4	26– 0	1	1	Le Rhone	80	2°	1°	4– 0	3– 9	26– 0	23– 0
Orenco C-2	Biplane Land	T.	18–10	7– 4	26– 0	1	1	Le Rhone	80	2°	1°	4– 0	3– 9	26– 0	23– 0
Orenco C-3	Biplane Land	T.	18–10	7– 4	26– 0	1	1	Le Rhone	80	2°	1°	4– 0	3– 9	26– 0	23– 0
Orenco E	Biplane Land	TF	28– 7	10– 2	45– 0	2	1	Liberty-12	400	3°	3°	6– 6	6– 6	45– 0	45– 0
Orenco E-2	Biplane Land	TF	28– 7	11–10	43– 0	2	1	Liberty-12	400	3°	3°	6– 6	6– 6	43– 0	43– 0
Orenco H-2	Biplane Land	O	36– 0	13– 0	56– 0	3	2	Hispano-Suiza	600	5°	3°	8– 0	6– 7	56– 0	42– 0
Thomas-Morse MB-3	TB Land	F.	19–11	8– 0	26– 0	1	1	Hispano-Suiza	300	−⅜°	−⅜°	5– 3	5– 3	26– 0	24– 6
Thomas-Morse S-4-C	TB Land	T.	19–10	8– 1	26– 6	1	1	Le Rhone	80	2¼°	2¼°	5– 6	4– 3	26– 6	25– 6
Thomas-Morse S-4-E	TB Land	T.	19– 4	7– 0	22– 6	1	1	Le Rhone	80	....	....	....	....	22– 6	22– 6
Thomas-Morse S-5	TB Seaplane	T.	22– 9	9– 7	26– 6	1	1	Gnome Mono	100	....	....	....	....	26– 6	26– 6
U. S. Army Le Pere C-2	TB Land	F.	25– 3	9– 7	41– 7	2	1	Liberty-12	400	1°	1°	5– 6	5– 6	41– 7	41– 7
U. S. Army USB-1	TB Land	F or DB	25– 5	8– 3	39– 4	2	1	Hispano-Suiza	310	....	....	5– 6	5– 6	39– 4	39– 4
U. S. Army USD-9-A	TB Land	R	30– 3	10– 6	45–11	2	1	Liberty-12	400	3°	3°	5– 9	5– 9	45–11	45–11
U. S. Navy F-5-L	TB Boat	ASP	49– 4	18– 9	103– 9	4 or 5	2	Liberty-12	660	3¾°	3¾°	8– 0	8– 0	103– 9	74– 4
Wittemann-Lewis TT	TB Land	T.	27– 2	11– 7	42– 0	2	1	Hall-Scott	100	4½°	4°	5– 6	5– 5	42– 0	34– 0

KEY TO NOTATION USED ON SHEETS OF TABULATED DATA

A—Ambulance
AT—Australian trip machine
ASP—Auti-submarine patrol
B—Bombing
C—Commercial (passenger and freight)
DB—Day bombing
F—Fighting
FF—Fire fighting
G—General service (Military)
M—Mail carrier
O—Observation (Military)
P—Passenger
PB—Pusher biplane
PM—Pusher monoplane
PP—Police patrol
PT—Pusher triplane

itary and Naval Type Airplanes

tries by Arch. & Don. R. Black)

WINGS AND TAIL DATA—*Continued*											WEIGHT IN LBS.					PERFORMANCE								
AREAS IN SQUARE FEET							Gap, Ft.-In.	Stagger, In.	Sweep-back	Dihe-dral	Empty	Gas and Oil	Useful Load	Total Gross	Useful per Cent Gross	Lb. / H.P.	Lb. / Sq. Ft.	HIGH SPEED		Low Speed, M.P.H.	CLIMB		Service or Approx. Ceiling (Feet)	Range at High Speed (Miles)
Wings, Tails	Ailerons	Stabilizer	Elevators	Vertical Fin	Rudder	Non-Skid Planes												M.P.H.	Altitude (Feet)		Minutes	Feet		
50	58.0	39.0	25.6	15.0	17.0	..	6-6	8	....	2°	1,835	278	640	2,475	25.9	19.0	4.9	75.0	..	43	10.0	2,600	10,000	188
495	56.0		30.0	6.0	12.0	..	6-0	29½	....	2¾°	1,940	155	515	2,455	21.0	24.6	5.0	73.0	..	46	10.0	2,500	.....	160
170	..	..	..	..	..	..	4-2	....	....	....	1,820	..	280	2,100	13.3	11.4	12.4	Estim. 170.0	..	50-60	..	..	Estim. 14,700	510
..	..	..	..	..	..	..	5-0	16½	....	....	1,988	..	1,013	3.001	33.8	7.5	....	160.5 152.0	.. 20,000	59	10.0 27.0	12,500 20,000	22,000	500
287	21.6	14.3	13.0	5.2	8.7	..	..	..	5°	....	1,825	445	1,075	2,900	37.2	7.2	9.4	163.0	..	58	10.0	15,000	.....	550
2,380	265.0	276.6	240.1	79.0	69.0	..	13-6	9	....	0° up. 3° low.	13,000	..	9,000	22,000	41.0	20.4	9.2	80.0	..	..	..	..	.....	.....
2,380	265.0	276.6	240.1	79. .	69.0	..	13-6	9	....	0° up. 3° low.	15,874	9,650	12,126	28,000	43.4	17.5	11.7	85.0	..	..	..	..	.....	.....
53	35.2	28.7	22.0	3.8	12.0	..	5-1	16°	....	1°	1,595	190	550	2,145	25.6	14.3	6.1	93.0	..	50	96.0	18,000	18,000	232
803	105.3	54.8	45.6	19.6	26.0	16.0	7-7	....	....	2°	4,300	About 670	2,132	6,432	33.1	19.5	8.0	91.0	..	55	10 0	2,750	.....	.....
1,164	131.0	108.0	58.4	31.1	27.9	24.0	8-0	....	....	1°	6,500	1695	3,500	10,900	32.1	16.5	9.4	95.0	..	56	10 0	3,000	.....	370
390	34.4	25.0	22.9	18.9	16.8	..	5-10 to 4-8	....	4½°	+3° up. −1° low.	2,450	550	1,150	3,600	31.9	9.4	9.2	126.0	..	62	10.0	9,700	.....	330
496	..	29.0	22.0	8.0	12.0	8.5	5-0	12°	....	....	2,000	..	510	2,510	20.3	16.7	5.1	85.0	..	46	10.0	3.600	.....	.....
440	70.6	38.5	24.0	6.0	13.5	..	5-6	12°	....	2½°	2,591	457	1,191	3,782	31.5	9.5	8.6	120.5 114.0	.. 10,000	..	13.8	10,000	19,000	.....
117	18.0	7.5	5.5	..	3.3	..	3-9 to 3-3	9	....	0° up. 3° low.	476	76	Approximately 236	712	33.1	19.2	6.1	81.0	..	38	10.0	3,000	.....	243
612	46.0	37.6	23.5	..	17.2	12.0	7-0	....	....	....	3,915	650	1,525	5,440	28.0	13.5	8.8	118.0	..	46	10.0 15.0	6,000 8,100	.....	378
350	40.0	..	..	..	..	..	5-1	8	....	1°	1,200	..	700	1,900	36.8	19.0	5.4	90.0	..	40	10.0	6,000	.....	.....
299	37.4	19.0	17.0	2.3	7.8	..	4-9	11°	....	1¼°	1,295	181	630	1,925	32.7	12.8	6.4	110.0 103 5	.. 10,000	48	4.7 13.0	5,000 10,000	20,750	250
72	11.0	4.8	5.3	2.5	2.6	..	..	....	....	1°	360	64	224	584	38.3	9.7	8.1	100.0	..	50	10.0	7,000	.....	100
116	10.0	6.6	7.5	4.0	3.6	..	..	..	....	1°	525	80	240	765	31.4	12.8	6.6	100.0	..	50	10.0	7,000	Approx. 8,500	200
215	24.0	14.9	15.0	8.8	9.0	..	..	....	....	1°	1,130	290	1,188	2,608	45.6	7.0	10.0	146.0	..	53	20.0	2,000	26,000	.....
516	59.1	29.2	27.7	3.2	14.0	..	6-0	7⅛	....	....	2,675	622	1,348	4,023	33.5	9.3	7.8	136.0	1,000	About 55	5.0 11.0	5,000 10,000	21,000	340
1,080	130.0	62.3	43.2	17.6	32.9	..	8-6	....	....	....	5,862	1492	3,801	9,663	39.3	12.1	9.0	113.3	..	56	10.8 21.4	6,500 10,000	17,000	.....
1,980	130.0	62.3	43.2	17.6	32.9	..	8-6	....	....	....	5,835	1775	3,665	9,500	38.6	11.9	8.8	About 115.0	..	55	25.0	0,000	15,000	460
180	17.9	12.2	13.3	2.4	5.4	..	3-9	12	....	....	985	210	305	1,290	23.6	8.1	7.2	135.0 126.0	.. 10,000	45	3.3 7.0	5,000 10,000	.....	202
180	17.9	12.2	13.3	2.4	5.4	..	3-9	7	....	....	835	98	282	1,117	25.3	14.0	6.2	102.0 90.0	.. 10,000	40	6.8 18.0	5,000 10,000	.....	200
180	17.9	12.2	13.3	2.4	5.4	..	3-9	13½	....	....	748	110	342	1,090	31.4	13.6	6.1	108.0 94.0	.. 10,000	42	5.3 16.5	5,000 10,000	.....	230
180	17.9	12.2	13.3	2.4	5.4	..	3-9	13½	....	....	835	110	282	1,117	25.3	14.0	6.2	102.0 90.0	.. 10,000	42	6.8 18.0	5,000 10,000	.....	230
557	92.8	36.8	27.2	6.2	13.6	..	6-0	....	....	....	4,090	215	1,520	5,610	27.1	14.0	10.1	120.0 98.0	.. 10,000	60	6.0 18.0	5,000 10,000	.....	120
525	60.8	26.8	29.6	4.5	15.2	..	5-9	22	....	1½°	2,973	675	2,039	5,012	40.7	12.5	9.6	130.0 120.0	.. 10,000	50	6.0 14.0	5,000 10,000	.....	406
680	68.5	33.3	34.0	11.0	32.2	..	7-0	5	....	....	3,362	1140	2,470	5,832	42.3	9.2	8.6	140.0 128.0	.. 10,000	48	3.5 8.5	5,000 10,000	.....	450
250	22.0	10.3	17.0	2.3	7.3	..	4-0	....	....	2°	1,427	..	610	2,037	30.0	6.8	8.2	163.6	..	..	4.9	10,000	.....	.....
234	25.0	16.8	16.8	3.5	8.5	..	4-6	32	....	....	..	220	..	1,330	..	14.8	5.7	97.0	..	45	10.0	7,500	.....	364
145	16.4	11.2	16.8	3.8	7.3	..	..	....	....	....	..	..	..	1,150	..	12.8	8.0	112.0	..	55	10.0	8,500	17,000	280
240	30.0	16.8	22.0	3.5	8.5	..	..	....	....	....	..	..	..	1,500	..	14.3	6.2	95.0	..	50	10.0	5,200	.....	285
415	64.4	17.0	33.4	3.4	13.1	..	5-0	25	....	....	2,561	484	1,185	3,746	31.6	9.3	9.1	136.0 127.6	.. 10,000	.. ..	9.8 36.6	10,000 20,000	20,800	.....
229	56.7	21.8	17.0	9.7	7.0	..	5-5	18½°	....	3°	1,842	344	1,068	2,910	36.7	9.7	7.9	113.6 109.6	6,000 10,000	..	5.6 10.8	6,000 10,000	23,000	.....
490	72.3	39.1	23.6	5.2	13.5	..	6-2	12½	....	3°	2,815	940	1,706	4,521	37.7	11.3	9.3	124.0 116.0	.. 10,000	62	9.2 16.7	6,500 10,000	17,000	.....
1,397	118.0	121.0	56.0	35.0	39.0	30.0	8-11	....	....	1½°	8,250	..	4,750	13,000	36.5	19.7	9.3	87.0	..	57	10.0	2,625	.....	531
About 398	34.9	..	21.6	5.4	12.0	..	5-6	....	....	1½°	1,560	..	605	2,165	28.0	21.6	5.4	74.0	..	38	10.0	3,000	15,000	.....

NOTE.—All of these machines are either in production now or built to order. Data on several recent American designs have been omitted by request of the War and Navy Departments.

KEY TO NOTATION USED ON SHEETS OF TABULATED DATA

PQ—Pusher quadruplane
R—Reconnaissance
S—Scout
SP—Sport
SS—Ship scout
T—Training
TA—Transatlantic
TB—Tractor biplane
TPB—Tractor pusher biplane
TPT—Tractor pusher triplane
TF—Trench fighter
TM—Tractor monoplane
TP—Torpedo plane
TT—Tractor triplane
TQ—Tractor quadruplane

TABLE III—British Com

(Compiled for Automotive Industries

Manufacturer and Model	Type	Use	GENERAL				POWER PLANT			WINGS AND TAIL DATA					
			Over-all Dimensions			Crew and Pass.	Engines		Total H.P.	Angle of Incidence		Chord		Span	
			Length, Ft.-In.	Height, Ft.-In.	Width, Ft.-In.		No.	Make		Upper	Lower	Upper, Ft.-In.	Lower, Ft.-In.	Upper, Ft.-In.	Lower, Ft.-In.
Aircraft Mfg. Co., Ltd. Airco 4A	TB Land	P	29- 6	....	42- 5	3	1	Rolls-Royce	360	3°	3°	5- 6	5- 6	42- 5	42- 5
Aircraft Mfg. Co., Ltd. Airco 16	TB Land	P	30- 3	11- 4	45-11	5	1	Rolls-Royce	360	3°	3°	5- 9	5- 9	45-11	45-11
Austin Motor Co., Ltd. Austin Whippet	TB Land	SP	16- 0	....	21- 6	1	1	Anzani	45	....	....	3- 8	3- 8	21- 6	21- 6
Beardmore WB VIII	TPT Land	C	62- 0	23- 0	120- 0	....	3	Beardmore Atlantic	1500	....	....	All	10-0	All	120-0
Boulton & Paul P-6	TB Land	SP	19- 0	8- 0	25- 0	2	1	R.A.F.	100	....	....	5- 0	5- 0	25- 0	25- 0
Boulton & Paul P-8	TB Land	C	40- 0	12- 4	61- 0	3	2	Napier Lion	900	....	....	8- 0	6- 6	61- 0	61- 0
Boulton & Paul P-9	TB Land	SP	25- 0	10- 0	27- 6	2	1	R.A.F.	100	....	....	5- 6	5- 6	27- 6	27- 6
Bristol All Metal	TB Land	P	27- 0	10- 3	42- 2	2 or 3	1	Hispano-Suiza	180	....	....	6- 0	6- 0	42- 2	42- 2
Bristol Babe	TB Land	P	14- 2	5-10	20- 0	2 or 3	1	A.B.C. Gadfly	45	....	....	....	....	20- 0	20- 0
Bristol Coupe	TB Land	P	25- 9	10- 1	39- 3	2 or 3	1	Rolls-Royce	275	....	....	5- 6	5- 6	39- 3	39- 3
Bristol Monoplane	TB Land	SP	20- 4	8- 0	30- 9	1	1		110	....	....	5-11	....	30- 9	....
Bristol Single-Seater	TB Land	SP	20- 0	7-10	29- 6	1	1	Mercury	310	....	....	5- 7	4-11	29- 6	26- 2
Bristol Tourer	TB Land	P	25- 9	10- 1	39- 3	2 or 3	1	Rolls-Royce	275	....	....	5- 6	5- 6	39- 3	39- 3
Bristol Pullman	TPB Land	C	51- 6	20- 8	81- 8	14	4	Liberty	1600	2½°	2½°	8- 6	8- 6	81- 8	78- 3
B. A. T. Co. FK-24 Baboon	TB Land	SP	22- 8	8-10	25- 0	2	1	A.B.C. Wasp	170	....	....	5- 7	5- 7	25- 0	25- 0
B. A. T. Co. FK-26	TB Land	C	34- 8	11- 3	46- 0	5	1	Rolls-Royce Eagle	350	....	....	6- 6	6- 6	46- 0	46- 0
B. A. T. Co. FK-27	TB Land	SP	20- 7	7-10	26- 0	2	1	A.B.C. Wasp II	200	....	....	5- 7	3- 0	26- 0	22-10
Central A. Co. CF-2-A	TB Land	C	39- 3	12- 6	63- 6	9	2	Beardmore	320	....	....	7- 6	7- 6	63- 6	63- 6
Gosport Fire Fighter	TB Boat	FF	4)- 0	19- 0	103- 0	10	2	Rolls-Royce	720	....	....	8- 0	8- 0	103- 0	73- 0
Gosport Mail Boat	TB Boat	M or C	41- 0	15- 7	79- 0	6	2	Rolls-Royce	5 0	....	....	7- 6	7- 6	79- 0	66- 0
Gosport Patrol Boat	PB Boat	PP	27- 4	10- 0	48- 6	2	1	Rolls-Royce	280	....	....	5- 6	5- 6	48- 6	48- 6
Gosport Shrimp	PB Boat	SP	19- 0	7- 3	23- 0	1	1	A.B.C.	45	....	....	4- 6	3- 0	23- 0	17- 3
Gosport Touring Boat	PB Boat	P	25- 0	8- 5	40- 0	2	1	Beardmore	160	....	....	5- 6	5- 6	40- 0	28- 0
Grahame-White Aero Limousine	TB Land	P	39- 0	11- 0	60- 0	4 or 6	2	Rolls-Royce Eagle	640	....	....	6- 7	6- 7	60- 0	60- 0
Martinsyde A-1	TB Land	AT	27- 5	11- 0	43- 4	2	1	Rolls-Royce Falcon	275	....	....	6- 6	6- 6	43- 4	43- 4
Nieuport London	TT Land	C	39- 6	17- 6	60- 8	12 or 14	2	A.B.C. Dragonfly	640	All	3°	All	6-8	All	60- 8
Nieuport Single Seater	TB Land	SP	16- 6	8- 0	25- 6	1	1	Cosmos Lucifer	100	3°	3°	4- 3	4- 3	25- 6	25- 6
Nieuport Two-Seater	TB Land	C	18- 0	7- 9	26- 0	2	1	Cosmos Lucifer	100	....	....	4- 6	4- 6	26- 0	26- 0
Avro Schneider Cup Seaplane	TB Seaplane	SP	21- 4	9- 9	25- 6	1	1	Siddeley Puma	240	....	....	4- 6	4- 6	25- 6	25- 6
Sopwith Schneider Cup Seaplane	TB Seaplane	SP	21- 6	....	24- 0	1	1	Cosmos Jupiter	450	....	....	5-1½	5-1½	24- 0	24- 0
Sopwith Wallaby	TB	AT	31- 6	....	46- 6	2	1	Rolls-Royce	375	....	....	6- 3	6- 3	46- 6	46- 6
Vickers Vimy Commercial	TB Land	C	42- 8	15- 3	67- 0	12	2	Rolls-Royce Eagle	750	3½°	3½°	10- 6	10- 6	67- 0	67- 0
Westland Limousine	TB Land	C	28- 6	10- 9	38- 2	4	1	Rolls-Royce	275	2°	2°	6- 3	6- 3	38- 2	38- 2

New German Department for Aerial and Automobile Traffic

THE Department of Transport began its activities in the German Republic Oct. 1, last. It has charge of the entire railroad service and of transport by inland waterways, and a special section concerns itself with the organization of traffic by aircraft and automobiles.

Previously no less than four departments of the Government shared in the economic, technical and police control of these important methods of transportation. This is to be entirely changed in future. Already all authority in technical automobile matters of the State Transport Department has been transferred to the new section for aerial and automobile traffic, and all that remains for the old department is to dispose of surplus army material.

It will be the problem of the new department to create a comprehensive network of State automobile routes extending over the whole country, and at the same time to improve conditions of private automobile traffic and to regulate it.

It is reported that there is more confusion and illegal traffic in connection with the automobile trade than with anything else, and in view of the scarcity of raw materials, fuels and rubber, this illegal trade should be stopped as quickly as possible. It is urged that the orders to be placed by the Government for new automobiles and for repair work should be distributed as uniformly as possible, as this would tend to steady prices. One plan that

mercial Air Planes—1919-20

by Arch. & Don. R. Black)

WINGS AND TAIL DATA—*Continued*											WEIGHT IN LBS.					PERFORMANCE								
AREAS IN SQUARE FEET							Gap, Ft.-In.	Stagger, In.	Sweep-back	Dihe-dral	Empty	Gas and Oil	Useful Load	Total Gross	Useful per Cent Gross	Lb. / H.P.	Lb. / Sq. Ft.	HIGH SPEED		Low Speed, M.P.H.	CLIMB		Service or Approx. C. ling (Feet)	Range at High Speed (Miles)
Wings, Tails	Ailerons	Stabilizer	Elevators	Vertical Fin	Rudder	Non-Skid Planes												M.P.H.	Altitude (Feet)		Minutes	Feet		
434	82.0	38.0	24.0	5.4	13.7	..	6- 0	....	....	3°	2,600	..	1,120	3,720	30.0	10.3	8.6	....	..	..	..	..	.....	.....
487	74.4	38.0	24.0	5.4	13.7	..	5- 6	12	....	3°	3,000	..	1,400	4,400	31.8	12.2	9.0	....	..	..	..	..	.....	.....
134	16.0	10.5	9.0	3.5	5.5	..	3- 9	....	....	....	500	..	230	730	31.5	10.7	5.4	....	..	..	6.0	5,000	.....	.....
3260	220.0	430.0	72.0	77.0	105.0	..	8- 0	....	....	....	14,260	5000	13,060	27,320	47.9	18.2	8.4	92	..	53	14.0 15.0	10,000 5,000	.....	540
235	30.0	25.0	15.0	2.5	9.0	..	5- 0	....	....	....	1,100	185	625	1,725	36.2	17.2	7.4	81 103	10,000 ..	50	41.0 9.0	10,000 5,000	.....	.....
829	120.0	60.0	38.0	30.0	20.0	..	6- 6	....	....	....	4,000	1760	3,000	7,000	42.9	7.7	8.4	149 142	10,000 15,000	54	8.0 15.0	10,000 15,000	25,000	.....
285	37.8	25.0	15.0	2.8	9.0	..	5- 6	....	....	....	1,244	166	526	1,770	29.7	17.7	6.3	104	..	47	8.5	5,000	.....	.....
458	59.0	27.8	30.0	7.8	8.3	..	..	....	....	....	1,700	..	1,170	2,870	40.8	16.0	6.3	110 106	.. 5,000	47	8.0 20.0	5,000 10,000	.....	.....
..	..	..	..	..	..	..	..	....	....	....	..	..	..	654	..	14.5	....	90	..	40	..	..	.....	190
405	..	..	..	..	..	..	..	....	....	....	1,750	..	1,050	2,800	37.5	10.2	6.9	128 125	.. 5,000	48	5.0 11.2	6,000 10,000	.....	.....
145	..	..	..	..	..	..	..	....	....	....	850	..	450	1,300	34.6	11.8	9.0	130 127	.. 5,000	49	3.5 9.0	5,000 10,000	.....	.....
260	..	..	..	..	..	..	..	....	....	....	1,350	..	530	1,880	28.2	6.1	7.2	143	10,000	49	2.0 5.2	5,000 10,000	.....	.....
405	..	..	..	..	..	..	..	....	....	....	1,750	515	1,050	2,800	37.5	10.2	6.9	125	..	..	5.0 12.0	5,000 10,000	.....	.....
1905	192.0	96.5	85.0	28.2	25.0	..	7- 2	....	6½°	2°	10,650	3600	5,850	16,500	35.5	10.3	8.7	125 113	.. 10,000	55	6.0	5,000	.....	.....
259	24.0	15.8	12.0	5.2	6.0	..	4- 8	....	....	2°	950	100	400	1,350	29.6	7.9	5.2	90	..	40	12.0	10,000	.....	.....
580	52.0	43.0	23.6	8.0	10.8	..	6- 6	....	....	2°	2,700	720	1,800	4,500	40.0	13.0	7.7	122 110	.. 10,000	50	4.0 10.0	500 10,000	18,000	.....
200	15.0	17.1	6.3	2.8	4.4	..	3-11	8.5	....	3°	800	200	600	1,400	42.9	7.0	7.0	142 130	.. 10,000	50	2.0	5,000	24,000	.....
895	140.0	65.0	32.0	15.0	20.0	..	7- 6	....	....	4°	3,850	400	2,000	5,850	34.2	16.7	6.6	90	..	40	..	..	.....	.....
1380	..	..	..	..	..	..	9- 0	....	....	....	8,900	1250	3,600	12,500	28.8	17.3	9.1	89	..	42	..	..	14,000	425
1000	..	..	..	..	..	..	7- 6	....	....	....	3,400	650	2,000	6,400	31.3	11.4	6.4	100	..	45	..	..	15,000	350
520	..	..	..	..	..	..	6- 0	....	....	....	1,940	345	880	2,820	31.2	10.1	5.4	91	..	42	..	..	22,000	375
140	..	..	..	..	..	..	3- 6	....	....	....	480	75	270	750	36.0	16.6	5.4	65	..	35	..	..	10,000	275
340	..	..	..	..	..	..	6-0 to 5- 3	....	....	....	1,350	220	650	2,000	32.5	12.5	5.9	75	..	35	..	..	14,000	210
725	106.0	52.0	32.0	11.2	25.0	..	6- 6	....	....	4°	5,785	1162	2,162	7,947	27.2	12.4	10.9	116 105	.. 10,000	50	4.0 9.9	5,000 10,000	17,000	.....
522	69.3	26.0	18.6	6.7	10.0	..	5- 6	....	....	....	1,800	780	2,800	4,600	61.0	16.0	9.2	125 118	.. 10,000	45	8.0 18.0	5,000 10,000	.....	.....
1100	120.0	24.0	40.0	30.0	20.0	..	5-10	....	....	3°	4,737	1108	3,793	8,530	55.5	13.3	7.7	100	..	..	30.0	10,000	17,500	400
200	20.0	24.0	9.0	3.6	4.0	..	4- 0	....	....	3°	750	150	300	1,050	28.6	10.5	5.3	100	..	..	13.0	10,000	20,000	300
220	20.0	21.0	10.0	4.2	6.0	..	4- 3	....	....	....	850	150	380	1,230	30.9	12.3	5.6	90	..	..	20.0	0,000	18,000	.....
200	22.0	20.0	8.0	4.0	5.2	..	4- 3	....	....	....	..	..	..	..	..	..	....	....	..	..	..	..	.....	.....
222	27.0	13.0	9.7	3.8	4.2	..	4- 6	−2½	....	....	1,600	..	600	2,200	36.6	4.9	10.0	....	..	..	..	..	.....	.....
550	42.0	36.8	20.0	3.8	9.5	..	6- 0	3	....	....	2,780	..	2,420	5,200	46.3	14.5	9.4	121	..	48	..	..	15,000	.....
1330	232.0	112.0	60.0	26.0	22.0	..	10- 0	....	....	....	7,292	1480	3,828	11,120	34.4	14.8	8.4	110 103	.. 6,000	45	17.0 48.0	6,000 10,000	450	.....
440	64.0	30.0	22.0	6.0	11.3	..	6- 0	12	....	2½°	2,010	..	1,216	3,226	37.7	15.0	7.7	100 91	.. 10,000	50	8.3 19.	5,000 10,000	17,000	300

has been submitted is to create a State automobile transport system similar to the railroad system. This would involve the organization of a bureau of control, a fleet of vehicles and of repairshops. Government control of the sale of benzol (the most available fuel) will probably soon be discontinued, as there has been a strong demand for this from motorists, who expect considerable advantage from such a step, because it would put a stop to illegal traffic.

It is also proposed to submit the present legal and police regulations to a searching revision, in order to eliminate restrictions and regulations which are not in accordance with the spirit of the times.

As regards aerial traffic, it is planned to build up new State routes on the private routes already in existence. The Government will make special effort to meet the demands of the industry, and direct the incoherent attempt into sound channels. However, to what extent new aerial traffic lines for passengers and mail matter can be established depends very much upon the supply of raw materials, and is a question that cannot be answered at the moment.

SENATOR J. E. RANSDELL, president of the National Rivers and Harbors Congress, in presenting his annual report to the fifteenth annual convention of the Congress at Washington, said that it would take an appropriation of more than $4,000,000,000 to enlarge the railroad transportation system of the country to meet the transportation needs of the next decade, but would take only about $500,000,000 to develop waterways of the country to meet the same need by supplementing rail transportation.

TABLE IV—British Military and Naval Airplanes on Which

(Compiled for Automotive Industries

Manufacturer and Model	GENERAL						POWER PLANT			WINGS AND TAIL DATA					
	Type	Use	Over-all Dimensions			Crew and Pass.	Engines		Total H P.	Angle of Incidence		Chord		Span	
			Length, Ft.-In.	Height, Ft.-In.	Width, Ft.-In.		No.	Make		Upper	Lower	Upper, Ft.-In.	Lower, Ft.-In.	Upper, Ft.-In.	Lower, Ft.-In.
Aircraft Mfg. Co. DH-1	PB Land		29- 0	....	41- 0	2	1	Renault	70	5½°	5½°	5- 9	5- 9	41- 0	41- 0
Aircraft Mfg. Co. DH-1A	PB Land		29- 0	....	41- 0	2	1	Beardmore	120	5½°	5½°	5- 9	5- 9	41- 0	41- 0
Aircraft Mfg. Co DH-2	PB Land	S	25- 3	....	28- 3	1	1	Gnome Mono	100	3°	3°	4- 9	4- 9	28- 3	28- 3
Aircraft Mfg. Co DH-3	PB Land	B	36- 9	....	60- 3	3	2	Beardmore	240	5°	5°	6- 9	6- 9	60- 3	60- 3
Aircraft Mfg. Co DH-4	TB Land	F	30- 0	....	42- 5	2	1	B. H. P	200	3°	3°	5- 6	5-	42- 5	42- 5
Aircraft Mfg. Co DH-4	TB Land	F	30- 0	....	42- 5	2	1	R. A. F. 3A	200	3°	3°	5- 6	5- 6	42- 5	42- 5
Aircraft Mfg. Co DH-4	TB Land	F	30- 0	....	42- 5	2	1	Rolls-Royce	250	3°	3°	5- 6	5- 6	42- 5	42- 5
Aircraft Mfg. Co DH-4	TB Land	F	30- 0	....	42- 5	2	1	Rolls-Royce	370	3°	3°	5- 6	5- 6	42- 5	42- 5
Aircraft Mfg. Co DH-5	TB Land	F	22- 0	9- 6	25- 8	1	1	Le Rhone	110	2°	2°	4- 6	4- 6	25- 8	25- 8
Aircraft Mfg. Co DH-6	TB Land	T	27- 4	....	35-11	2	1	R. A. F. or Curtiss	90	4°	4°	6- 4	6- 4	35-11	35-11
Aircraft Mfg. Co DH-9	TB Land	DB	30-10	11- 2	42- 5	2	1	B. H. P	230	3°	3°	5- 6	5- 6	42- 5	42- 5
Aircraft Mfg. Co DH-9	TB Land	DB	30-10	11- 2	42- 5	2	1	Napier Lion	420	3°	3°	5- 6	5- 6	42- 5	42- 5
Aircraft Mfg. Co DH-9A	TB Land	DB	30- 3	11- 4	45-11	2	1	Liberty	400	3°	3°	5- 9	5- 9	45-11	45-11
Aircraft Mfg. Co DH-10	TB Land	DB	38-10	....	62- 9	3	2	Rolls-Royce Eagle	750	7°	7°	7- 0	7- 0	62- 9	62- 9
Aircraft Mfg. Co DH-10	TB Land	DB	39- 8	14-10	65- 6	3	2	Li erty	800	7°	7°	7- 0	7- 0	65- 6	65- 6
Aircraft Mfg. Co DH-10A	TB Land	DB	39- 8	14- 6	65- 6	3	2	Liberty	800	7°	7°	7- 0	7- 0	65- 6	65- 6
Armstrong Whitworth FK-3	TB Land	R	28- 6	10- 3	40- 0	1	1	R. A. F	90	2¼°	1¾°	5- 8	5- 8	40- 0	40- 0
Armstrong Whitworth FK-8	TB Land	F	30- 8	10- 6	43- 0	2	1	Beardmore	160	2¼°	2¼°	6- 6	6- 6	43- 0	43- 0
Armstrong Whitworth FK-10	TO Land	F	22- 3	....	27-10	1	1	Clerget	130	All	3°	All	3- 7	All	27-10
Armstrong Whitworth Armadillo	TB Land	F	18-10	7-10	27- 9	1	1	BR-2	230	2¼°	1°	5- 3	4- 6	27- 9	27- 9
Armstrong Whitworth Ara	TB Land	F	20- 3	7-10	27- 5	1	1	A. B. C. Dragonfly	320	2¾°	1¼°	5- 3	4- 6	27- 5	27- 5
Austin Ball	TB Land	F	21- 6	9- 3	30- 0	1	1	Hispano-Suiza	200	....	....	5- 0	5- 0	30- 0	30- 0
Austin Greyhound	TB Land	F	....	1 - 4	30- 0	2	1	A. B. C. Dragonfly	320	....	....	6- 5	4- 3	39- 0	36- 7
Beardmore WB-1	TB Land	B	32-10	14- 9	61- 6	2	1	Sunbeam	240	....	....	7- 0	7- 0	61- 6	61- 6
Beardmore WB-IA	TB Land	B	32-10	15- 8	70- 0	2	1	Beardmore Atlantic	515	....	....	7- 0	7- 0	70- 0	70- 0
Beardmore WB-II	TB Land	F	27- 3	10-11	34-10	2	1	Hispano-Suiza	200	....	....	5- 6	5- 6	34-10	34-10
Beardmore WB-IIA	TB Land	F	27- 7	10- 1	34-10	2	1	Beardmore Atlantic	230	....	....	5- 6	5- 6	34-10	34-10
Beardmore WB-III	TB Land	R	20- 3	8- 1	25- 0	1	1	Le Rhone	80	....	....	5- 2	5- 2	25- 0	25- 0
Beardmore WB-IV	TB Land	R	26- 6	9-11	35-10	1	1	Hispano-Suiza	200	....	....	6- 3	4- 9	35-10	35-10
Beardmore WB-V	TB Land	R	26- 7	11-10	35-10	1	1	Hispano-Suiza	200	....	....	- 3	6- 3	35-10	35-10
Beardmore WB-VI	TB Land	TP	34- 0	12- 6	53- 7	1	1	Rolls-Royce	350	....	....	8-10	7- 9	53- 7	47-11
Blackburn Blackbird	TB Land	TP	36- 3	12- 5	52- 6	....	1	Rolls-Royce Eagle	350	....	....	7- 0	7- 0	52- 6	52- 6
Blackburn Kangaroo	TB Land	B	46- 0	16-10	74-10	2	2	Rolls-Royce Falcon	550	....	....	7- 3	7- 3	74-10	55- 7
Blackburn Twin Seaplane	TB Seaplane	B	44- 2 46- 0	16-10	74-10	....	2	Rolls-Royce Falcon	500	....	....	7- 3	7- 3	74-10	27-10
Boulton & Paul Bobolink	TB Land	F	20- 0	8- 4	29- 0	1	1	BR-2	230	....	....	5- 5	4- 2	29- 0	29- 0
Boulton & Paul P-6	TB Land	T	19- 0	8- 0	25- 0	2	1	R. A. F	100	....	....	5- 0	5- 0	25- 0	25- 0
Boulton & Paul P-7 Bourges	TB Land	DB	37- 0	12- 0	54- 0	3	2	A. B. C. Dragonfly	640	....	....	8- 0	6- 6	54- 0	54- 0
Boulton & Paul P-9	TB Land	T	25- 0	10- 0	27- 6	2	1	R. A. F	100	....	....	5- 6	5- 6	27- 6	....
B. A. T. Co. FK-24 Baboon	TB Land	T	22- 8	8-10	25- 0	2	1	A. B C. Wasp	170	....	....	5- 7	5- 7	25- 0	25- 0
B. A. T. Co. FK-23 Bantam	TB Land	F	18- 4	6- 9	25- 0	1	1	A. B. C. Wasp	170	....	....	4- 0	4- 0	25- 0	25- 0
B. A. T. Co. FK-25 Basilisk	TB Land	F	20- 5	8- 2	25- 4	1	1	A. B. C. Dragonfly	340	....	....	4- 6	4- 6	25- 4	25- 4
Bristol Braemar	TPT Land	B	51- 6	20- 8	81- 8	2	4	Siddeley Puma	1000	All	2½°	All	8- 6	Up.&M 81- 8	78- 3
Bristol D	TB Land	S	20- 5	9- 8	24- 5	1	1	Clerget	80 & 110	2½°	2½°	4- 6	4- 6	24- 5	24- 5
Bristol D	TB Land	S	20- 8	....	24- 7	1	1	Le Rhone	80	2½°	2½°	4- 6	4- 6	24- 7	24- 7
Bristol F	TB Land	S	20-10	....	29- 6	1	1	Sunbeam Arab	200	1°	1°	5- 7	4-11	29- 6	26- 2
Bristol F-2-B	TB Land	F	25-10	9- 4	39- 3	1	1	Rolls-Royce Falcon	253	1½°	1½°	5- 6	5- 6	39- 3	39- 3
Bristol MR-1	TB Land		27- 0	10- 3	42- 2	2	1	Hispano-Suiza	170	....	....	6- 0	6- 0	42- 2	42- 2
Bristol Monoplane	TB Land	S	20- 7	9- 6	30- 9	1	1	Clerget	120	....	....	5-11	....	30- 9	....

Authentic Data Have Been Released Since November 11, 1918.

by Arch. & Don. R. Black)

WINGS AND TAIL DATA—*Continued*											WEIGHT IN LBS.					PERFORMANCE								
AREAS IN SQUARE FEET																		HIGH SPEED		LOW SPEED, M.P.H.	CLIMB			
Wings, Tails	Ailerons	Stabilizer	Elevators	Vertical Fin	Rudder	Non-Skid Planes	Gap, Ft.-In.	Stagger, In.	Sweepback	Dihedral	Empty	Gas and Oil	Useful Load	Total Gross	Useful per Cent Gross	Lb. H.P.	Lb. Sq. Ft.	M.P.H.	Altitude (Feet)		Minutes	Feet	Service or Approx. Ceiling (Feet)	Range at High Speed (Miles)	Year of Production
362	64.0	37.5	23.0	3.7	15.4	..	5–11	....	....	3°	..	..	..	..	..	..	....	....	..	..	..	..	....	..	1915
362	64.0	37.5	23.0	3.7	15.4	..	5–11	....	....	3°	..	..	..	2,400	..	20.0	6.60	89.0	..	..	12.2	6,000	....	..	1915
249	56.0	20.6	13.5	2.7	11.0	..	4– 9	....	....	4°	..	..	..	1,320	..	13.2	5.30	93.0	..	..	18.5	10,000	....	..	1915
625	102.0	76.0	50.0	10.0	21.3	..	7– 6	....	....	4°	..	..	..	5,776	..	24.0	9.20	95.0 87.0	.. 10,000	..	32.8	8,000	....	700	1915 1916
434	82.0	38.0	24.0	5.4	13.7	..	5– 6	12	....	3°	2,010	330	1,140	3,150	36.2	15.0	7.32	113.5 104.0	6,500 15,000	52.0	17.5 35.5	10,000 15,000	19,000	600	1917
434	82.0	38.0	24.0	5.4	13.7	..	5– 6	12	....	3°	..	450	..	3,340	..	16.2	7.70	120.0 110.6	6,500 15,000	52.0	14.2 29.3	10,000 15,000	19,000	500	..
434	82.0	38.0	24.0	5.4	13.7	..	5– 6	12	....	3°	2,306	501	1,054	3,360	31.4	12.9	7.70	117.0 102.5	6,500 15,000	52.0	16.4 36.7	10,000 15,000	19,000	500	..
434	82.0	38.0	24.0	5.4	13.7	..	5– 6	12	....	3°	2,403	524	1,069	3,472	30.8	9.6	8.00	136.5 126.0	6,500 15,000	52.0	9.0 16.5	10,000 15,000	23,500	500	..
212	46.4	13.4	12.2	2.2	6.3	..	4– 9	27	....	4°	1,015	..	525	1,540	34.1	14.0	7.10	105.0 89.0	6,500 15,000	50.0	12.4 27.5	10,000 15,000	17,000	200	..
436	76.0	36.0	26.0	5.5	12.0	..	5– 9	....	....	2°	..	..	..	2,000	..	22.2	4.60	75.0 70.0	.. 6,500	30.0	..	..	....	300	1917
434	82.0	38.0	24.0	5.4	13.7	..	5– 6	12	....	3°	2,200	628	1,100	3,300	33.3	14.3	7.60	116.0 101.0	6,500 15,000	50.0	17.9 35.0	10,000 15,000	19,000	560	..
434	82.0	38.0	24.0	5.4	13.7	..	5– 6	12	....	3°	2,600	580	1,125	3,725	30.2	8.8	8.50	140.0 135.0	10,000 15,000	..	8.2 14.6	10,000 15,000	25,300	..	..
487	74.4	38.0	24.0	5.4	13.7	..	5– 6	12	....	3°	..	..	..	4,220	..	10.5	8.60	129.0 114.0	6,500 15,000	55.0	11.8 22.8	10,000 15,000	21,000	650	1918
835	120.8	71.6	46.0	10.0	25.8	..	7– 0	....	4°	4½°	..	..	..	..	..	..	....	....	..	..	..	..	....	..	1918
837	118.0	75.5	33.1	10.0	25.8	..	7– 0	....	2½°	4½°	5,750	1,755	3,250	9,000	36.1	11.1	10.60	128.0	..	..	12.4 24.5	10,000 15,000	17,750	..	1918
837	118.0	75.5	33.1	10.0	25.8	..	7– 0	....	2½°	4½°	..	..	..	8,500	..	10.6	10.00	134.0 117.0	6,500 15,000	55.0	11.0 20.5	10,000 15,000	20,000	650	1918
442	64.0	27.0	22.0	5.8	9.5	..	5–11	23	....	4°	1,700	..	600	2,300	26.1	25.5	5.20	87.0 65.0	.. 10,000	38.0	25.0	10,000	16,000	..	1915
524	72.0	28.0	13.0	7.5	15.0	..	5– 9	19½	....	5°	1,720	..	1,280	3,000	42.7	18.8	5.70	102.0 98.0	.. 10,000	45.0	20.0	10,000	20,000	..	1916
398	67.2	..	16.0	1.9	8.0	..	2– 8	17	....	1½° 0° up. 2° low.	1,143	..	661	1,804	36.7	13.9	4.50	105.0 99.0	.. 10,000	..	17.0	10,000	25,000	..	1917
250	36.0	17.0	14.0	1.6	6.0	..	3–11	8½	....	2° low.	1,250	..	610	1,860	32.8	8.0	7.40	125.0 113.0	.. 10,000	55.0	6.5	10,000	24,000	..	1918
257	20.4	25.0	24.0	2.5	11.0	..	3–11	11½	....	1½°	1,320	..	605	1,925	31.4	6.0	7.50	150.0 144.0	.. 10,000	55.0	4.5	10,000	28,000	..	1919
290	30.0	16.0	16.0	..	8.0	..	4– 9	....	....	....	1,426	270	659	2,075	31.8	9.3	7.00	138.0 126.0	.. 10,000	..	10.0	10,000	....	..	..
400	45.2	27.2	19.8	5.1	9.9	..	5– 0	....	....	....	2,050	540	1,040	3,090	33.7	10.3	7.70	130.0	10,000	45.0	11.0	10,000	....	..	..
796	113.3	106.0	40.0	14.2	20.0	..	7– 0	....	....	....	3,410	1,090	2,190	5,600	39.1	23.0	7.00	91.0	..	48.0	26.0 44.0	5,000 10,000	....	670	..
946	118.0	110.0	33.5	14.2	20.0	..	7– 0	....	....	....	4,537	1,660	4,363	8,900	49.0	17.3	9.40	110.0 101.0	.. 10,000	65.0	12.0 27.0	5,000 10,000	....	670	..
354	64.0	49.0	21.0	6.0	11.5	..	5– 6	....	....	....	1,765	345	885	2,650	33.4	13.2	7.50	120.0 111.0	.. 10,000	50.0	7.0 15.0	5,000 10,000	....	340	..
354	64.0	49.0	21.0	8.1	11.5	..	5– 0	....	....	....	1,650	590	1,050	2,700	38.9	11.7	7.60	125.0 117.0	.. 10,000	50.0	5.0 12.0	5,000 10,000	....	560	..
243	23.0	34.5	11.5	3.5	4.5	..	4– 9	....	....	....	880	110	410	1,290	31.8	16.1	5.30	103.0 88.0	.. 10,000	40.0	9.0 24.0	5,000 10,000	....	280	..
350	37.6	50.5	24.0	8.0	12.0	..	4– 9	....	....	....	1,960	300	640	2,600	24.6	13.0	7.50	110.0 102.0	.. 10,000	45.0	7.0 18.0	5,000 10,000	....	380	..
394	37.6	50.5	24.0	8.0	12.0	..	4– 9	....	....	....	1,860	300	640	2,500	25.6	12.5	6.30	112.0 103.0	.. 10,000	45.0	6.0 17.0	5,000 10,000	....	380	..
796	95.5	80.0	32.4	10.0	12.0	..	7– 6	....	....	....	3,027	550	2,610	5,637	46.3	15.6	7.00	102.0 91.0	.. 10,000	47.0	15.0 41.0	5,000 10,000	....	300	..
709	85.0	48.0	34.0	18.0	9.0	..	7– 0	....	....	....	3,080	565	2,260	5,340	42.3	15.3	7.50	92.0 84.0	.. 10,000	..	11.5 33.5	5,000 10,000	....	..	..
880	166.5	80.0	63.5	25.0	22.5	..	7– 3	....	....	5°	5,150	1,790	2,950	8,100	36.4	16.2	9.20	99.0	..	..	..	..	....	..	..
880	166.5	79.5	63.5	25.0	22.5	..	7– 3	....	....	....	5,840	1,570	2,760	8,600	32.1	17.2	9.80	100.0	..	..	..	..	....	800	1916
266	30.0	20.0	10.0	2.0	10.0	..	3–11	....	....	....	1,220	340	700	1,920	36.4	8.4	7.30	125.0 110.0	10,000 15,000	50.0	9.5 18.0	10,000 15,000	....	..	..
235	..	Stab. 40	&Elev. .0	2.5	9.0	..	5– 0	....	....	....	1,100	..	625	1,725	36.2	17.25	7.35	103.0	1,000	45.0	9.0	5,000	....	244	..
738	108.0	64.0	32.0	14.0	21.0	..	6– 6	....	....	....	3,420	1,680	2,500	5,920	42.2	9.2	8.00	124.0	10,000	50.0	11.0 21.0	10,000 15,000	....	..	..
285	..	Stab. 40	&Elev. .0	2.8	9.0	..	5– 6	....	....	....	1,244	..	526	1,770	29.7	17.7	6.30	104.0	1,000	42.0	8.5	5,000	....	312	..
259	24.0	15.8	12.0	5.3	6.0	..	4– 9	....	....	2°	950	..	400	1,350	29.6	7.95	5.20	90.0	..	40.0	12.0	10,000	....	180	..
185	18.0	16.0	6.5	2.7	4.0	..	3– 4	....	....	....	810	200	525	1,335	39.4	7.8	7.20	138.0 134.0	.. 10,000	50.0	7.2 14.0	10,000 15,000	25,000	425	1917
220	30.0	13.7	8.3	2.6	4.5	..	4– 4	....	....	....	1,340	330	688	2,028	33.9	6.3	9.50	162.0 154.0	.. 10,000	52.0	5.0 9.3	10,000 15,000	29,000	475	..
1905	192.0	96.5	85.0	28.2	25.0	..	7– 3	....	6½°	2°	9,300	3,360	6,900	16,200	42.5	16.2	8.50	106.0 93.0	.. 10,000	57.0	35.0	10,000	15,000	700	1918
200	23.5	23.0	15.0	..	7.0	..	4– 4	16	....	3½°	..	..	..	1,100	..	10.0	5.50	95.0	..	..	26.5	10,000	....	..	1915
200	23.5	23.0	15.0	..	7.0	..	4– 3	21	....	3½°	..	..	..	1,250	..	14.7	6.30	100.0 86.0	.. 10,000	45.0	18.5	10,000	17,000	330	1915
260	30.5	15.0	14.5	4.1	5.3	..	5– 1	25	....	....	..	235	..	2,100	..	10.0	8.10	138.0 128.0	.. 10,000	50.0	8.5 16.0	10,000 15,000	25,000	270	1918
405	50.0	22.2	23.2	10.7	7.2	..	5– 5	17	....	3½°	1,934	300	845	2,779	30.4	11.0	6.90	125.0 113.0	.. 10,000	50.0	11.2 21.3	10,000 15,000	22,000	268	1916
458	59.0	27.8	30.0	7.8	8.3	..	5–11	....	....	3½°	1,700	350	1,100	2,810	39.5	16.5	6.20	110.0 98.0	.. 10,000	48.0	20.0	10,000	16,000	420	1917
145	18.0	20.0	15.0	5.0	4.5	..	..	....	....	2°	909	181	411	1,320	31.1	11.0	9.10	128.0 110.0	5,400 15,000	..	3.4 8.5	5,000 10,000	....	384	1916

TABLE IV—British Military and Naval Airplanes on Which

(Compiled for Automotive Industries

Manufacturer and Model	GENERAL						POWER PLANT			WINGS AND TAIL DATA					
	Type	Use	Overall Dimensions			Crew and Pass.	Engines		Total H.P.	Angle of Incidence		Chord		Span	
			Length, Ft.-In.	Height, Ft.-In.	Width, Ft.-In.		No.	Make		Upper	Lower	Upper, Ft.-In.	Lower, Ft.-In.	Upper, Ft.-In.	Lower Ft.-In.
Bristol Monoplane	TB Land	S	20- 4	....	30- 9	1	1	Le Rhone	110	....	....	5-11	....	30- 9	....
Fairey F-2	TB Land	F	40- 7	13- 6	77- 0	....	2	Rolls-Royce	380	....	....	5- 6	5- 6	77- 0	...
Fairey Hamble Baby	TB Seaplane	B	23- 4	9- 6	27-10	1	1	Clerget	110	....	....	4- 9	4- 9	27-10	....
Fairey F-16 Campania	TB Seaplane	SS	43- 4	15- 1	61- 8	2	1	Rolls-Royce	250	....	....	6- 4	6- 4	61- 8	...
Fairey F-17 Campania	TB Seaplane	SS	43- 4	15- 1	61- 8	2	1	Rolls-Royce	275	....	....	6- 4	6- 4	61- 8	....
Fairey F-22 Campania	TB Seaplane	SS	43- 1	15- 1	61- 8	2	1	Sunbeam	260	....	....	6- 4	6- 4	61- 8	....
Fairey N-4	TPB Boat	R	66- 0	29- 6	139- 0	....	4	Rolls-Royce	2400	....	....	12- 6	12- 6	139- 0	93- 0
Fairey N-9	TB Seaplane	R	35- 6	13- 0	50- 0	2	1	Rolls-Royce	190	....	....	5- 6	5- 6	50- 0	....
Fairey Type III	TB Seaplane	SS	36- 0	13- 0	46- 2	2	1	Sunbeam	260	....	....	5- 6	5- 6	46- 2	46- 2
Fairey Type IIIA	TB Land	SS	31- 0	13- 0	44- 0	2	1	Sunbeam	260	....	....	5- 6	5- 6	44- 0	44- 0
Fairey Type IIIB	TB Seaplane	B	26- 0	13- 0	62- 9	2	1	Sunbeam	260	....	....	....	....	62- 9	....
Fairey Type III-C	TB Seaplane	R	.....	.....	.....	2	1	Rolls-Royce	375	....	....	....	....	....	....
Felixstowe F-2-A	TB Boat	ASP	46- 3	17- 6	95- 8	4 to 6	2	Rolls-Royce	700	4¼°	4¼°	7- 1	7- 1	95- 8	68- 5
Felixstowe F-3	TB Boat	ASP	49- 2	18- 8	102- 0	4 to 6	2	Rolls-Royce	700	4°	4°	8- 0	8- 0	102- 0	74- 2
Felixstowe F-5	TB Boat	ASP	49- 2	.....	102- 0	4 to 6	2	Rolls-Royce	700	4°	4°	8- 0	8- 0	102- 0	74- 2
Felixstowe Porte Super	TPT Boat	ASP	60- 0	27- 6	123- 0	6	5	Rolls-Royce	1750	....	....	....	....	123- 0	....
Handley-Page 0-400	TB Land	B	62-10	22- 0	100- 0	3	2	Liberty	800	3°	3°	10- 0	10- 0	100- 0	70- 0
Handley-Page V-1500	TPB Land	B	62- 0	23- 0	126- 0	6	4	Rolls-Royce Eagle	1440	....	....	12- 0	12- 0	126- 0	126- 0
Martinsyde F-4	TB Land	F	25- 6	10- 4	32- 9	1	1	Hispano-Suiza	300	....	....	6- 1	5- 6	32- 9	31- 2
Nieuport BN-1	TB Land	S or F	18- 6	9- 0	28- 0	1	1	BR-2	230	3°	3°	6- 0	4- 2	28- 0	28- 0
Nieuport London	TT Land	B	39- 6	17- 6	60- 8	....	2	A. B. C. Dragonfly	640	....	....	All	6-8	All	60- 8
Nieuport Nighthawk Single-Seat	TB Land	F	....	....	27- 6	1	1	A. B. C. Dragonfly	320	3°	3°	5- 3	5- 3	27- 6	27- 6
Nieuport Nighthawk Double-Seat	TB Land	F	18- 0	9- 0	28- 0	2	1	A. B. C. Dragonfly	320	....	....	5- 3	5- 3	28- 0	28- 0
Nieuport Type-17	TB Land	S or F	18- 3	8- 9	27- 6	1	1	Le Rhone	110	1½°	3°	4- 1	2- 5	27- 6	26- 6
Parnall Panther	TB Land	R	24-11	10- 6	29- 6	2	1	BR-2	210	....	....	6- 3	6- 3	29- 6	29- 6
Phoenix P-5	TB Boat	ASP	48- 8	20- 0	85- 6	4	2	Rolls-Royce	720	....	....	9- 0	9- 0	85- 6	....
Avro 504-K	TB Land	T	28-11	....	36- 0	2	1	Le Rhone	110	4½°	4½°	4-10	4-10	36- 0	36- 0
Avro Pike 523	PB Land	F	39- 1	....	60- 0	3	2	Sunbeam	320	4°	4°	7- 0	7- 0	60- 0	60- 0
Avro 530	TB Land	F	28- 6	....	36- 0	2	1	Hispano-Suiza	200	2°	2°	5- 6	5- 6	36- 0	36- 0
Avro 529A	TB Land	B	39- 8	....	64- 1	3	2	B. H. P	440	2°	2°	7- 6	7- 6	64- 1	64- 1
Avro Spider 531	TB Land	S	20- 6	....	28- 6	1	1	Clerget	130	....	....	6- 0	2- 6	28- 6	21- 6
Avro Manchester I	TB Land	B	37- 0	....	60- 0	3	2	A. B. C. Dragonfly	640	4°	4°	7- 6	7- 6	60- 0	60- 0
Avro Manchester II	TB Land	B	37- 0	....	60- 0	3	2	Siddeley Puma	600	4°	4°	7- 6	7- 6	60- 0	60- 0
Avro 504L	TB Seaplane	.....	32- 1	.....	36- 0	2 or 3	1	Clerget	130	4½°	4½°	4-10	4-10	36- 0	36 -0
Avro 531A	TB Land	S	20- 6	....	28- 0	1	1	Clerget	130	1½°	1½°	4- 6	4- 6	28- 0	27- 0
Avro Popular 534	TB Land	T	17- 3	....	25- 0	1	1	Green	35	3½°	3½°	4- 0	4- 0	25- 0	25- 0
R. N. A. S. PV-2	TB Seaplane	F	22- 0	8- 4	27- 0	1	1	Gnome Monosoupape	100	....	....	5- 6	2- 6	27- 0	19- 0
R. N. A. S. PV-2 (BIS)	TB Seaplane	F	22- 0	9- 4	29- 0	1	1	Gnome Monosoupape	100	....	....	5- 6	2- 9	29- 0	19- 0
R. N. A. S. PV-4	PB Seaplane	F	....	....	32- 0	2	1	Clerget	110	....	....	....	....	32- 0	....
R. N. A. S. PV-5	TB Seaplane	F	25- 6	9- 9	32- 0	1	1	Hispano-Suiza	150	....	....	6- 0	3- 6	32- 0	21- 0
R. N. A. S. PV-5-A	TB Seaplane	F	26- 9	13- 1	33- 1	1	1	Hispano-Suiza	200	....	....	5- 0	....	33- 1	....
R. N. A. S. PV-7 Grain Kitten	TB Land	SS	14-11	5- 3	18- 0	1	1	A. B. C. Gnat	35	....	....	3- 6	2- 6	18- 0	12- 7
R. N. A. S. PV-8 Eastchurch Kitten	TB Land	SS	15- 8	5- 5	19- 0	1	1	A. B. C. Gnat	35	....	....	3- 0	3- 0	19- 0	19- 0
R. N. A. S. PV-9	TB Seaplane	F	25- 2	9- 0	30-11	1	1	BR-1	150	....	....	5- 6	3- 9	30-11	20- 1
R. N. A. S. Grain Griffin	TB Land	R	27- 3	10- 6	42- 6	2	1	Sunbeam Arab	207	....	....	6- 3	6- 3	42- 6	42- 6
Sage I	TB Land	B	38- 0	....	66- 0	3	2	Rolls-Royce	380	3°	3°	7- 0	7- 0	66- 0	45- 0
Sage II	TB Land	F or S	21- 2	....	22- 2	2	1	Gnome	100	2°	5°	5- 0	22- 2	22- 2	22- 2
Sage III A	TB Land	T	32-10	....	34- 6	2	1	Rolls-Royce	75	5°	3°	4- 9	4- 9	34- 6	34-

Authentic Data Have Been Released Since November 11, 1918.

by Arch & Don. R. Black.)

WINGS AND TAIL DATA—*Continued*											WEIGHT IN LBS.					PERFORMANCE								
AREAS IN SQUARE FEET							Gap, Ft.-In.	Stagger, In.	Sweep-back	Dihe-dral								HIGH SPEED			CLIMB				
Wings, Tails	Ailerons	Stabilizer	Elevators	Vertical Fin	Rudder	Non-Skid Planes					Empty	Gas and Oil	Useful Load	Total Gross	Useful per Cent Gross	Lb. H.P.	Lb. Sq. Ft.	M.P.H.	Altitude (Feet)	Low Speed, M.P.H.	Minutes	Feet	Service or Approx. Ceiling (Feet)	Range at High Speed (Miles)	Year of Production
145	18.0	20.0	15.0	5.0	4.5	..	..	....	....	2°	..	159	..	1,300	..	10.8	9.00	130.0	..	52.0	9.0	10,000	24,000	230	1916
																		117.0	10,000		19.0	15,000			
718	95.6	64.9	39.0	21.8	20.0	..	6- 0	....	....	....	..	..	..	4,680	..	13.0	6.80	93.3	..	..	6.0	5,000	....	..	1915
246	36.4	24.0	17.0	4.3	..	..	4- 6	....	....	....	..	..	..	1,900	..	17.2	7.80	97.0	..	..	8.0	5,000	....	300	..
640	46.8	47.0	28.1	14.0	28.0	..	6- 6	....	....	....	3,824	650	1,676	5,500	30.5	22.2	8.60	83.0	..	48.5	14.0	5,000	....	..	..
628	46.8	47.0	28.1	16.2	19.6	..	6- 6	....	....	....	3,810	650	1,750	5,560	31.5	19.5	8.70	90.0	..	49.0	12.5	5,000	....	..	..
628	46.8	47.0	28.1	16.2	19.6	..	6- 6	....	....	....	3,593	650	1,736	5,329	32.5	20.1	8.10	85.2	..	46.0	18.0	5,000	....	..	..
2900	83.0	300.0	50.0	50.0	50.0	..	14- 0	....	....	....	..	7,500	..	30,500	..	12.7	10.50	....	..	..	..	..	....	..	..
420	36.0	Stab. 34	&Elev. .2	Fin & 9.	Rud'r 8	..	5- 7	....	....	....	2,800	510	1,012	3,812	26.6	18.2	9.10	89.0	..	45.0	9.5	5,000	....	480	1917
																		85.0	10,000		38.0	10,000			
476	33.0	Stab. 34	&Elev. .2	Fin & 9.	Rud'r 8	..	5- 7	....	....	....	..	..	..	4,160	..	15.7	8.70	102.0	..	47.0	9.1	5,000	....	460	..
																		93.0	10,000		23.0	10,000			
476	33.0	Stab. 34	&Elev. .2	Fin & 9.	Rud'r 8	..	5- 7	....	....	....	..	..	..	3,694	..	13.9	7.80	108.0	..	46.0	7.1	5,000	....	490	..
																		103.0	10,000		17.3	10,000			
570	46.0	Stab. 34	&Elev. .2	Fin & 12	Rud'r .4	..	5- 7	....	....	....	..	..	..	4,892	..	18.5	8.50	94.0	..	48.0	12.3	5,000	.. ..	520	..
																		87.0	10,000		36.0	10,000			
..	..	..	..	..	..	..	..	....	....	....	..	..	..	5,050	..	13.5	10.60	110.0	..	50.0	6.4	5,000	....	660	..
																		103.0	10,000		17.3	10,000			
..	..	..	..	..	..	..	..	....	....	1°	..	..	..	..	..	..	....	96.0	2,000	..	3.8	2,000	9,900	..	..
																		85.0	10,000						
..	..	..	..	..	..	..	..	....	....	1½°	..	..	..	..	..	..	....	....	..	..	..	..	....	..	..
About 1400	..	..	..	..	..	..	..	....	....	....	8,250	..	4,750	13,000	36.5	18.6	9.30	....	..	..	..	..	....	..	..
..	..	..	..	..	..	..	..	....	....	....	..	..	..	23,400	..	13.3	....	....	..	..	..	..	....	..	..
1648	172.0	111.6	63.0	14.7	46.0	..	11- 0	....	....	4°	7,900	2,500	6,400	14,300	44.8	17.9	8.70	92.0	..	..	12.0	5,000	....	..	1915-
																		85.0	10,000		32.0	10,000			1916
3000	..	..	..	..	..	..	15- 0	....	....	....	15,000	7,200	15,000	30,000	50.0	21.0	10.00	103.0	..	50.0	12.0	5,000	....	..	..
																		99.0	6,500		21.0	10,000			
320	42.0	20.2	16.5	6.5	9.8	..	5- 3	....	....	....	1,710	..	570	2,280	25.0	7.5	7.00	145.0	..	45.0	3.0	5,000	....	530	..
																		126.0	20,000		19.3	20,000			
260	30.0	18.0	10.0	5.2	5.0	..	4- 3	....	....	3°	1,620	330	410	2,030	20.2	9.0	7.80	127.0	15,000	..	16.0	15,000	26,000	180	1918
1100	120.0	24.0	40.0	30.0	20.0	..	5-10	....	....	....	4,737	..	3,793	8,530	55.5	13.6	7.80	100.0	..	..	30.0	10,000	....	..	1919
..	..	..	..	..	..	..	..	22½	....	4°	1,428	..	672	2,100	31.9	6.6	....	150.0	5,000	..	6.0	10,000	28,000	..	1918
276	37.2	23.0	10.0	5.2	5.3	..	4- 6	....	....	....	2,180	288	650	2,830	22.9	6.8	8.10	138.0	10,000	..	20.0	20,000	....	..	1918-
																									1919
168	15.6	12.2	17.8	..	8.8	..	4-2 to 3- 5	27	4°	½° up. 3° low.	860	194	480	1,340	35.8	12.1	8.00	110.0	..	..	4.0	3,300	....	..	..
																					11.0	9,900			
336	45.2	18.4	19.3	6.8	4.4	..	6- 3	....	....	....	1,420	510	1,140	2,560	44.5	12.2	7.60	120.0	..	40.0	6.1	6,000	....	480	1917
																		116.0	6,000		12.5	10,000			
1310	..	..	..	..	..	..	..	....	....	2° up. 0° low.	..	..	..	11,600	..	16.1	....	106.0	..	..	30.0	10,000	....	..	..
330	45.5	26.0	18.0	..	9.0	..	5- 6	26	....	2½°	1,230	..	593	1,823	32.6	16.6	5.50	90.0	..	..	6.25	5,000	....	270	..
																		75.0	10,000		16.0	10,000			
815	122.0	80.0	45.0	17.5	21.0	..	7- 3	....	....	3½°	4,000	..	2,064	6,064	34.0	18.9	7.40	97.0	..	40.0	9.5	5,000	....	679	1916
																		80.0	10,000		27.0	10,000			
346	58.0	28.4	23.8	4.5	8.8	..	5- 0	21	....	1½°	1,685	..	995	2,680	37.1	13.4	8.20	118.0	..	45.0	6.0	5,000	18,000	472	1917
																		108.0	10,000		14.0	10,000			
910	128.8	48.4	36.8	10.0	24.5	..	7- 3	....	....	3°	4,361	..	2,774	7,135	38.9	16.2	7.80	116.0	..	45.0	7.0	5,000	....	604	1917
																		106.0	10,000		17.5	10,000			
208	22.0	15.2	10.4	..	7.8	..	4- 3	24	....	....	963	..	554	1,517	36.5	11.6	7.80	120.0	..	40.0	4.0	5,000	19,000	360	1918
																		110.0	10,000		9.5	10,000			
813	124.0	69.0	33.0	16.0	18.0	..	7- 3	....	....	2½°	4,079	..	2,507	6,586	38.1	10.3	8.10	128.0	..	45.0	4.5	5,000	20,000	736	1918
																		122.0	10,000		11.0	10,000			
817	124.0	50.0	35.0	12.0	16.0	..	7- 3	....	....	2½°	4,574	..	2,584	7,158	36.1	11.9	8.80	125.0	..	45.0	6.5	5,000	17,000	466	1918
																		119.0	10,000		11.5	10,000			
330	45.5	26.0	18.0	6.0	9.0	..	5- 6	26	....	2½°	1,403	..	598	2,006	29.8	18.2	6.10	89.0	..	40.0	8.5	5,000	....	160	1919
																		65.0	10,000		22.5	10,000			
210	29.2	17.5	11.0	..	7.8	..	4- 3	24	....	2°	960	..	554	1,514	36.6	11.6	7.20	120.0	..	40.0	4.0	5,000	19,000	360	..
																		110.0	10,000		9.5	10,000			
180	27.0	9.5	8.5	..	9.0	..	4- 0	16	....	3°	608	..	237	845	28.0	24.1	4.70	70.0	..	30.0	20.0	5,000	....	175	..
																		67.0	10,000						
168	..	..	..	..	..	..	3- 6	....	....	....	1,087	..	503	1,590	31.7	15.9	9.50	83.0	..	44.0	5.0	3,000	....	..	1916
180	..	..	..	..	..	..	4- 6	....	....	....	1,211	..	491	1,702	28.8	17.0	9.50	83.0	..	44.0	6.0	3,000	....	..	1917
																					35.6	10,000			
220	..	..	..	..	..	..	..	....	....	....	..	..	..	2,400	..	21.8	10.90	80.5	..	..	..	..	....	..	1917
245	..	..	..	..	..	..	4- 0	....	....	....	1,788	..	668	2,456	37.4	16.3	10.00	94.5	4.000	46.0	35.0	9,000	....	..	
309	..	..	..	..	..	..	5- 0	....	....	....	1,972	..	546	2,518	21.7	12.6	8.15	102.0	2,000	52.0	17.7	10,000	....	..	..
																		100.0	10,000						
85	..	..	..	..	..	..	3- 0	....	....	....	275	40	220	495	44.5	14.1	6.00	83.0	2,000	40.0	35.0	12,000	....	..	1917
106	..	..	..	..	..	..	3- 0	....	....	....	340	80	246	586	42.0	16.7	5.50	93.0	2,000	46.0	20.0	10,000	....	..	1917
227	..	..	..	..	..	..	4- 0	....	....	....	1,404	261	561	1,965	28.6	13.1	8.60	110.5	2,000	58.0	27.3	10,000	....	..	1917
																		99.5	10,000						1918
506	..	..	..	..	..	..	..	....	....	....	1,911	409	947	2,858	33.1	13.8	5.70	115.0	5,000	..	12.0	10,000	....	..	..
																		101.0	10,000						
777	117.0	44.0	30.0	20.0	15.0	..	7- 2	....	....	2½°	..	..	..	5,500	..	13.2	6.50	93.0	..	52.0	30.0	10,000	....	540	1916
168	25.0	20.0	14.5	..	9.0	..	5- 6	....	....	2°	..	..	..	1,546	..	15.5	9.20	112.0	..	55.0	14.8	10,000	16,000	308	1916
																		109.8	10,000		35.0	15,000			
330	72.0	26.0	24.0	4.0	10.0	..	5- 0	....	....	2½°	..	..	..	2,064	..	23.9	6.30	74.0	..	39.0	..	..	9,000	315	1916
																									1917

TABLE IV—British Military and Naval Airplanes on Which

(Compiled for Automotive Industries

Manufacturer and Model	GENERAL						POWER PLANT			WINGS AND TAIL DATA					
			Over-all Dimensions			Crew and Pass.	Engines		Total H.P.	Angle of Incidence		Chord		Span	
	Type	Use	Length, Ft.-In.	Height, Ft.-In.	Width, Ft.-In.		No.	Make		Upper	Lower	Upper, Ft.-In.	Lower, Ft.-In.	Upper, Ft.-In.	Lower, Ft.-In.
Sage III B	TB Land	T.	32-10	....	34- 6	2	1	Rolls-Royce	75	5°	3°	4- 9	4- 9	34- 6	34- 6
Sage IV A	TB Seaplane	T.	32- 6	....	34- 6	2	1	Hispano-Suiza	140	5°	3°	4- 9	4- 9	34- 6	34- 6
Sage IV B	TB Seaplane	T.	34- 0	....	34- 6	2	1	Sunbeam	200	5°	3°	4- 9	4- 9	34- 6	34- 6
Sage IV C	TB Seaplane	T.	37- 6	....	39- 7	2	1	Hispano-Suiza	200	3°	3°	5- 3	5- 3	39- 7	39- 7
Short N-2B	TB Seaplane	B.	4`- 0	13- 9	55- 0	2	1	Sunbeam Maori	260	....	....	7- 6	7- 6	55- 0	....
Short Shirl	TB Seaplane	TP	35- 6	....	52- 0	2	1	Rolls-Royce	400	....	....	8- 0	7- 0	52- 0	....
Short Cromarty	TB Boat	B.	59- 0	22- 0	113- 0	3	2	Rolls-Royce	700	....	....	11- 0	10- 0	11 - 0	....
Sopwith Baby	TB Seaplane		22-10	....	25- 8	1	1	Clerget	100	3°	3°	5- 2	5- 2	25- 8	25- 8
Sopwith Buffalo	TB Land	R.	23- 4	....	34- 6	2	1	BR-2	230	1¾°	1¾°	5- 6	5- 6	34- 6	34- 6
Sopwith Camel	TB Land	F.	18- 9	....	28- 0	1	1	AR-1	150	2°	2°	4- 6	4- 6	28- 0	28- 0
Sopwith Camel	TB Land	F.	18- 9	....	28- 0	1	1	BR-1	150	2°	°	4- 6	4- 6	28- 0	28- 0
Sopwith Camel	TB Land	F.	18- 9	....	28- 0	1	1	Clerget	150	2°	2°	4- 6	4- 6	28- 0	28- 0
Sopwith Camel	TB Land	F.	18- 9	....	28- 0	1	1	Gnome	100	2°	2°	4- 6	4- 6	28- 0	28- 0
Sopwith Camel	TB Land	F.	18- 9	....	28- 0	1	1	Gnome Monosoupape	150	2°	2°	4- 6	4- 6	28- 0	28- 0
Sopwith Camel	TB Land	F.	18- 9	....	28- 0	1	1	Le Rhone	126	2°	2°	4- 6	4- 6	28- 0	28- 0
Sopwith Cuckoo	TB Land	TP	28- 6	....	46- 9	1	1	Hispano-Suiza	200	3°	3°	6- 9	6- 9	46- 9	46- 9
Sopwith Dolphin	TB Land	F.	22- 3	....	32- 6	1	1	Hispano-Suiza	200	2°	2°	4- 6	4- 6	32- 6	32- 6
Sopwith Dolphin	TB Land	F.	22- 3	....	32- 6	1	1	Hispano-Suiza	300	2°	2°	4- 6	4- 6	32- 6	32- 6
Sopwith Gun Bus	PB Land		32- 6	....	50- 0	2	1	Sunbeam	150	4°	4°	5- 2	5- 2	50- 0	50- 0
Sopwith Pup	TB Land		19- 4	....	26- 6	1	1	Gnome Monosoupape	100	1½°	1½°	5- 2	5- 2	26- 6	26- 6
Sopwith Pup	TB Land		19- 4	....	26- 6	1	1	Le Rhone	84	1½°	1½°	5- 2	5- 2	26- 6	26- 6
Sopwith Salamander	TB Land	TF	19- 6	....	31- 3	1	1	BR-2	230	1¾°	1¾°	5- 0	5- 0	31- 3	30- 2
Sopwith Snipe	TB Land	F.	19-10	....	31- 1	1	1	BR-2	230	1¾°	1¾°	5- 0	5- 0	31- 1	30- 0
Sopwith Strutter	TB Land	F.	25- 4	....	33- 6	2	1	Le Rhone	126	2½°	2½°	5- 6	5- 6	33- 6	33- 6
Sopwith Strutter	TB Land	F.	25- 4	....	33- 6	...	1	Clerget	122	2°	2½°	5- 6	5- 6	33- 6	33- 6
Sopwith Tabloid	TB Land		20- 4	....	25- 6	2	1	Gnome	80	1°	1°	5- 2	5- 2	25- 6	25- 6
Sopwith Triplane	TT Land	F.	18-10	10- 5	26- 6	1	1	Clerget	130	All	2°	All	3-3	All	26- 6
Supermarine Baby	PB Boat	F.	24- 0	10- 6	30- 6	1	1	Hispano-Suiza	150	1½°	1½°	5- 6	5- 6	30- 6	....
Tarrant Tabor	TPT Land	B.	73- 3	37- 3	98- 5	5	6	Napier Lion	3000	All	3°	All	15-2	Up. Mid. Low. 98-5 131-3 98-5	
Vickers FB-5 Gun Bus	PB Land	F.	27- 2	....	36- 6	2	1	Gnome	100	4½°	4½°	5- 6	5- 6	36- 6	36- 6
Vickers FB-9	PB Land	F.	28- 6	....	32- 8	2	1	Gnome	100	3½°	3½°	5- 6	5- 6	32- 8	32- 8
Vickers ES-1 Barnwell Bullet	TB Land	F.	20- 3	8-10	24- 5	1	1	Gnome	100	....	....	4- 9	4- 9	24- 5	24- 5
Vickers ES-1 Barnwell Bullet	TB Land	F.	20- 3	8-10	24- 5	1	1	Clerget	100	....	....	4- 9	4- 9	24- 5	24- 5
Vickers FB-11			43- 0	....	51- 0	....	1	Rolls-Royce	250	2°	2°	9- 0	9- 0	51- 0	51- 0
Vickers FB-12	PB Land	S.	21- 6	....	26- 0	1	1	Le Rhone	80	3°	3°	5- 0	5- 0	26- 0	24- 0
Vickers FB-12	PB Land	S.	21- 6	....	29- 9	1	1	Le Rhone	110	3°	3°	4- 0	4- 0	29- 9	26- 9
Vickers FB-12	PB Land	S.	21- 6	....	29- 9	1	1	Gnome	100	3°	3°	5- 0	4- 0	29- 9	26- 9
Vickers FB-12	PB Land	S.	21- 6	....	29- 9	1	1	Anzani	100	3°	3°	5- 0	4- 0	29- 9	26- 9
Vickers FB-12	TB Land	R.	28- 5	....	39- 6	2	1	Beardmore	160	3°	3°	6- 6	6- 0	39- 6	33- 0
Vickers FB-14	TB Land	R.	26- 6	....	39- 6	2	1	Lorraine	150	3°	3°	6- 6	6- 0	39- 6	33- 0
Vickers FB-14	TB Land	R.	30- 8	....	42- 0	2	1	Rolls-Royce	250	3°	3°	6- 6	6- 0	42- 0	39- 6
Vickers FB-14	TB Land	R.	27- 0	....	39- 6	2	1	R. A. F	140	3°	3°	6- 6	6- 0	39- 6	33- 0
Vickers FB-16	TB Land	S.	19- 0	....	25- 0	1	1	Hispano-Suiza	150	2°	2°	5- 0	4- 2	25- 0	22- 4
Vickers FB-16	TB Land	S.	19- 6	....	25- 0	1	1	Hispano-Suiza	200	2°	2°	5- 6	4- 2	25- 0	22- 4
Vickers FB-16	TB Land	S.	21- 0	....	31- 0	1	1	Lorraine	275	2°	2°	5- 4	4- 2	31- 0	30- 0
Vickers FB-16	TB Land	S.	21- 8	....	31- 0	1	1	Hispano-Suiza	300	2°	2°	5- 4	4- 2	31- 0	30- 0
Vickers FB-19	TB Land	S.	18- 2	....	24- 0	1	1	Gnome	100	¼°	¼°	5- 0	5- 0	24- 0	24- 0
Vickers FB-19	TB Land	S.	18- 2	....	24- 0	1	1	Clerget	100	¼°	¼°	5- 0	5- 0	24- 0	24- 0

STUDEBAKER GOTHIC AND GRANITE

Authentic Data Have Been Released Since November 11, 1918

by Arch. & Don. R. Black.)

WINGS AND TAIL DATA—*Continued*

Areas in Square Feet							Gap, Ft.-In.	Stagger, In.	Sweep-back	Dihe-dral
Wings, Tails	Ailerons	Stabilizer	Elevators	Vertical Fin	Rudder	Non-Skid Planes				
330	72.0	26.0	24.0	4.0	10.0	..	5- 0	....	....	2½°
330	72.0	26.0	24.0	4.0	10.0	..	5- 0	....	....	2½°
330	72.0	26.0	24.0	5.0	9.0	..	5- 3	....	....	2½°
386	84.0	24.4	21.2	5.5	8.0	..	5- 3	....	....	3°
..	..	..	..	..	..	..	7- 0	....	....	....
..	..	..	..	..	..	..	6- 0	....	....	....
..	..	..	..	..	..	..	10- 0	....	....	....
240	..	14.0	12.0	2.7	6.5	..	4- 6	8	....	2°
326	44.0	23.0	15.8	4.0	9.0	..	4- 6	21	....	2½°
240	36.0	14.0	10.5	3.0	4.9	..	5-0 to 4-0	18	....	0° up. 5° low.
240	36.0	14.0	10.5	3.0	4.9	..	5-0 to 4-0	18	....	0° up. 5° low.
240	36.0	14.0	10.5	3.0	4.9	..	5-0 to 4-0	18	....	0° up. 5° low.
240	36.0	14.0	10.5	3.0	4.9	..	5-0 to 4-0	18	....	0° up. 5° low.
240	36.0	14.0	10.5	3.0	4.9	..	5-0 to 4-0	18	....	0° up. 5° low.
240	36.0	14.0	10.5	3.0	4.9	..	5-0 to 4- 0	18	....	0° up. 5° low.
566	80.0	35.6	18.0	5.7	8.0	..	6- 0	....	....	2½°
263	38.2	17.0	13.5	3.5	8.0	..	4- 3	−12	....	2½°
263	38.2	17.0	13.5	3.5	8.0	..	4- 3	−12	....	2½°
474	60.0	28.0	28.0	8.8	13.0	..	5- 6	12	....	3½°
254	22.0	23.0	11.8	3.5	4.5	..	4- 5	18	....	3°
254	22.0	23.0	11.8	3.5	4.5	..	4- 5	18	....	3°
272	51.0	15.0	11.0	2.8	9.0	..	4- 3	17	....	4°
271	45.0	15.0	11.0	2.8	9.0	..	4- 3	16	....	4°
353	52.0	35.5	21.5	3.5	7.3	..	5- 5	24	....	2½°
353	52.0	35.5	21 5	3.5	7.3	..	5- 5	24	....	2½°
241	28.0	11.8	11.8	1.8	4.3	..	4- 6	11	....	1½°
231	34.0	14.0	9.6	2.5	4.5	..	3- 0	18	....	2½°
309	..	..	..	..	..	..	..	....	....	3°
4950	210.0	368.0	216.0	84.0	62.0	..	14- 9	....	....	4°
382	57.0	56.0	24.6	8.5	13.3	..	6- 0	....	....	1°
340	57.0	54.0	24.6	8.5	13.3	..	6- 0	....	....	1½°
215	22.0	17.5	12.5	4.2	6.4	..	4- 0	....	....	....
215	22.0	17.5	12.5	4.2	6.4	..	4- 0	....	....	1°
845	113.0	79.5	55.5	19.0	25.0	..	9- 0	....	....	2°
204	32.0	18.0	14.4	5.6	6.7	..	4- 2	7½	....	3½°
237	42.0	18.0	14.4	7.3	6.7	..	4- 2	7½	....	3½°
237	42.0	18.0	14.4	7.3	6.7	..	4- 2	7½	....	3½°
427	55.0	41.0	30.0	12.3	10.4	..	6- 0	3	....	2°
427	55.0	41.0	30.0	12.3	10.4	..	6- 0	3	3°	2°
485	62.8	35.0	25.0	12.3	11.3	..	6- 0	3	....	2°
427	55.0	41.0	30.0	12.3	10.4	..	6- 0	23	....	2°
199	27.0	18.5	15.3	3.8	5.0	..	3- 9	26	....	1½°
207	23.5	18.5	15.3	6.5	6.0	..	3-11	30	....	1½°
272	31.0	18.5	15.3	7.0	6.5	..	3- 9	29	....	1½°
272	31.0	18.5	15.3	7.0	6.5	..	3- 9	29	....	1½°
215	25.2	17.5	12.5	5.3	6.5	..	4- 0	....	....	1°
215	25.2	17.5	12.5	5.3	6.5	..	4- 0	22	....	1°

WEIGHT IN LBS.					PERFORMANCE								
Empty	Gas and Oil	Useful Load	Total Gross	Useful Per Cent Gross	Lb. H.P.	Lb. Sq. Ft.	High Speed M.P.H.	High Speed Altitude (Feet)	Low Speed, M.P.H.	Climb Minutes	Climb Feet	Service or Approx. Ceiling (Feet)	Range at High Speed (Miles)	Year of Production
..	..	..	1,980	..	26.4	6.00	76.0	..	39.0	..	..	9,000	315	1916
..	..	..	2,662	..	16.0	8.10	83.5	..	45.0	32.0	10,000	12,600	328	1917
..	..	..	2,709	..	13.5	8.20	79.0 95.5	10,000 ..	53.0	25.0	10,000	14,400	220	1917
..	..	..	2,875	..	14.2	7.30	85.1 97.0	10,000 ..	45.0	21.4	10,000	15,500	220	1917
3,050	580	1,750	4,800	36.5	18.5	....	90.0	..	..	12.2	5,000	....	..	..
2,850	650	3,150	5,950	53.0	14.9	....	88.0 99.0	10,000 ..	..	40.0 13.0	10,000 5,000	....	..	..
11,000	4,500	7,000	18,000	38.8	12.8	7.60	97.0 101.0	10,000 ..	..	39.0 ..	10,000 ..	....	..	..
..	..	..	..	..	..	....	....	..	45.0	..	..	....	..	1915
2,230	Gas. 380	870	3,100	28.1	13.5	9.50	100.0	5,000	60.0	4.9 9.5	3,000 5,000	....	275	1918
977	Gas. 250	531	1,508	35.2	10.0	6.50	116.5 103.0	6,500 15,000	35.0	5.5 20.0	6,500 15,000	18,000	290	..
1,036	Gas. 223	494	1,530	32.3	10.2	6.70	118.0 112.0	10,000 15,000	38.0	11.5 25.0	10,000 15,000	18,000	310	..
929	Gas. 243	524	1,453	36.0	11.5	6.30	113.0 106.5	10,000 15,000	35.0	10.6 20.7	10,000 15,000	19,000	300	1916
882	Gas. 224	505	1,387	36.4	13.8	6.00	106.0 100.0	10,000 15,000	35.0	11.8 23.2	10,000 15,000	....	300	..
993	..	530	1,523	34.8	10.2	6.50	117.5 107.0	10,000 15,000	35.0	10.2 19.6	10,000 15,000	23,700	275	..
889	Gas. 252	533	1,422	37.5	10.4	6.16	118.5 111.0	10,000 15,000	35.0	9.2 16.8	10,000 15,000	24,000	330	..
1,840	..	1,530	3,370	45.4	17.0	6.40	100.0	10,000	40.0	14.5 26.0	6,500 15,000	19,000	420	1917
1,406	Gas. 475	475	1,881	25.2	9.0	7.30	128.5 124.0	10,000 15,000	40.0	8.3 14.7	0,000 15,000	123,500	230	1917
1,566	Gas. 194	792	2,358	33.6	7.5	9.00	140.0 133.0	10,000 16,400	40.0	8.3 12.2	10,000 16,400	24,600	290	..
..	Gas. 504	..	..	..	..	....	....	..	40.0	..	..	....	..	1914
856	Gas. 441	441	1,297	34.0	12.4	5.20	104.0 100.0	10,000 15,000	30.0	12.4 23.4	10,000 15,000	18,500	190	1916
787	Gas. 181	438	1,225	35.8	14.6	4.80	104.5 94.0	10,000 15,000	30.0	14.4 30.8	10,000 15,000	17,500	320	1916
1,844	Gas. 178	666	2,510	26.6	11.0	9.40	123.0 117.0	6,500 10,000	60.0	17.1	10,000	14,000	..	1918
1,310	Gas. 258	710	2,020	35.1	8.9	7.50	121.0 113.0	10,000 15,000	40.0	9.5 18.8	10,000 15,000	20,500 20,500	370	1917
1,281	Gas. 343	924	2,205	42.0	17.5	6.40	103.0	10,000	35.0	18.9 41.5	10,000 15,000	16,000	..	1916
1,316	Gas. 404	1,026	2,342	43.8	18.8	6.70	102.0	6,500	35.0	12.7 24.6	6,500 10,000	13,000	..	1915
730	Gas. 502	390	1,120	34.8	14.0	4.70	92.0	..	36.0	..	..	....	320	..
1,103	Gas. 245	440	1,543	28.5	12.4	6.00	106.5 95.0	10,000 15,000	35.0	11.8 22.3	10,000 15,000	20,500	31	1916
1,700	Gas. 180	626	2,326	26.9	15.5	7.50	117.0	..	57.0	..	..	....	..	..
26,000	10,000	19,000	45,000	42.2	15.0	9.10	110.0	..	..	..	..	13,000	1200	..
1,220	..	830	2,050	40.5	20.5	5.40	70.0	5,000	41.0	16.0	5,000	9,000	..	1914-1915
1,160	..	840	2,000	42.0	20.0	5.90	80.0	5,000	47.0	15.0	5,000	10,500	..	1915
843	..	452	1,295	34.9	13.0	6.00	114.0	5,000	46.0	6.7	5,000	15,500	..	1915
921	..	537	1,458	36.8	14.6	6.80	109.0	5,000	50.0	18.0 6.4	10,000 5,000	15,500	..	..
3,340	..	1,594	4,934	32.4	19.8	5.90	96.0	5,000	46.0	18.0 16.5	10,000 5,000	11,000	..	..
845	..	432	1,277	33.8	16.0	6.30	81.5 91.0	10,000 5,000	48.0	55.0 9.1	10,000 5,000	12,500	..	1916
927	..	520	1,447	36.0	13.2	6.10	82.0 81.0	10,000 10,000	48.0	27.6 6.9	10,000 5,000	16,500	..	..
885	..	545	1,400	39.0	14.0	5.90	93.0	5,000	47.0	18.5 7.7	10,000 5,000	14,000	270	1916
952	..	521	1,473	35.4	14.7	6.30	79.0	10,000	48.0	21.1 10.6	10,000 5,000	12,000	296	..
1,627	..	983	2,610	37.7	16.3	6.10	90.0	5,000	40.0	35.6 14.3	10,000 5,000	13,000	337	1916
1,832	..	788	2,620	30.1	17.5	6.20	84.0 83.5	10,000 10,000	41.0	37.0 11.6	10,000 5,000	14,000	250	..
2,289	..	1,019	3,308	30.8	13.2	6.80	110.0	10,000	43.0	33.6 6.1	10,000 5,000	17,000	285	..
1,734	..	853	2,587	33.0	18.5	6.10	92.0	10,000	40.0	15.4 6.4	10,000 5,000	15,000	276	..
1,170	..	504	1,674	30.1	11.2	8.40	121.0	5,000	53.0	16.5 5.6	10,000 5,000	18,000	261	1916
1,376	..	499	1,875	26.6	9.4	9.10	116.0 135.0	10,000 10,000	55.0	12.6 4.8	10,000 5,000	20,000	304	..
1,495	..	705	2,200	32.1	8.0	8.10	137.0	10,000	51.0	10.4 3.5	10,000 5,000	24,000	285	..
1,636	..	664	2,300	28.9	7.7	8.50	....	..	53.0	7.8 ..	10,000 ..	....	..	..
900	..	585	1,485	39.4	15.0	6.90	102.0	10,000	49.0	5.3	5,000	17,500	280	1916
890	..	585	1,475	39.7	15.0	6.90	98.0	10,000	49.0	14.0 5.5 14.5	10,000 5,000 10,000	16,500	295	..

TABLE IV—British Military and Naval Airplanes on Which

(Compiled for Automotive Industries

Manufacturer and Model	GENERAL						POWER PLANT			WINGS AND TAIL DATA					
	Type	Use	Over-all Dimensions			Crew and Pass.	Engines		Total H.P.	Angle of Incidence		Chord		Span	
			Length, Ft.-In.	Height, Ft.-In.	Width, Ft.-In.		No.	Make		Upper	Lower	Upper, Ft.-In.	Lower, Ft.-In.	Upper Ft.-In.	Lower Ft.-In.
Vickers FB-19	TB Land	S.	18- 2	....	24- 0	1	1	Le Rhone	110	¼°	¼°	5- 0	5- 0	24- 0	24- 0
Vickers FB-24	TB Land	F.	26- 0	....	35- 6	2	1	Hispano-Suiza	200	2°	2°	6- 6	5- 0	35- 6	30- 0
Vickers FB-24	TB Land	F.	26- 6	....	37- 6	2	1	Lorraine	275	2°	2°	6- 9	5- 0	37- 6	31- 0
Vickers FB-24	TB Land	F.	30- 0	....	38- 3	2	1	Lorraine	375	2°	2°	6- 6	6- 6	38- 3	38- 3
Vickers FB-25	PB Land	Rocket Gun	28- 1	....	41- 6	2	1	Hispano-Suiza	150	3°	3°	6- 3	6- 3	41- 6	41- 6
Vickers Vampire	PB Land	F.	23- 5	....	31- 6	1	1	Hispano-Suiza	200	2°	2°	5- 6	4- 6	31- 6	29- 0
Vickers Vampire (Armored)	PB Land	TF.	22-11	....	31- 6	1	1	BR-2	200	2°	2°	5- 6	4- 6	31- 6	27- 6
Vickers EFB-7	TB Land	B.	36- 0	....	59- 6	2	2	Gnome	200	3°	3°	8- 3	6- 0	59- 6	37- 6
Vickers EFB-8	TB Land	B.	28- 2	....	38- 4	2	2	Gnome	200	3°	3°	7- 0	5- 9	38- 4	36- 8
Vickers FB-27	TB Land	B.	43- 7	....	68- 4	2	2	Hispano-Suiza	400	3½°	3½°	10- 6	10- 6	68- 4	68- 4
Vickers FB-27	TB Land	B.	43- 7	....	67- 2	2	2	Sunbeam Maori	520	3½°	3½°	10- 6	10- 6	67- 2	67- 2
Vickers Vimy	TB Land	B.	43- 7	....	67- 2	2	2	Fiat	520	3½°	3½°	10- 6	10- 6	67- 2	67- 2
Vickers Vimy	TB Land	B.	43- 7	....	67- 2	2	2	Rolls-Royce Eagle	700	3½°	3½°	10- 6	10- 6	67- 2	67- 2
Vickers Vimy	TB Land	B.	43- 7	....	67- 2	2	2	Salmson	520	3½°	3½°	10- 6	10- 6	67- 2	67- 2
Vickers Vimy	TB Land	B.	43- 7	....	67- 2	2	2	Rolls-Royce Eagle	700	3½°	3½°	10- 6	10- 6	67- 2	67- 2
Westland N-16-17	TB Seaplane	F or SS.	25- 4	11- 2	31- 4	1	1	AR-1	150	....	....	5- 0	5- 0	31- 4	31- 4
Westland Wagtail	TB Land	F.	18-11	8- 0	23- 2	1	1	Wasp	173	....	....	4- 6	4- 6	23- 2	23- 2

KEY TO NOTATION USED ON SHEETS OF TABULATED DATA

A—Ambulance
AT—Australian trip machine
ASP—Auti-submarine patrol
B—Bombing
C—Commercial (passenger and freight)
DB—Day bombing
F—Fighting
FF—Fire fighting
G—General service (Military)
M—Mail carrier
O—Observation (Military)
P—Passenger
PB—Pusher biplane
PM—Pusher monoplane
PP—Police patrol
PT—Pusher triplane

Excepting where otherwise stated, all of the machines in the above table are either in production or are built to order.

Limit System with the Hole as Basis

Diameter from — to	Limit Plug Gages						Limit Snap Gages					
	A.*			B.**			Light Running Fit			Running Fit		
	Min.	Max.	Tol.	Min.	Max.	Tol.	Min.	Max.	Tol.	Min.	Max.	Tol.
3/4 — 1/8	−.00016	+.00016	.00032	−.00008	+.00008	.00016	−.00083	−.00043	.00040	−.00043	−.00020	.00023
1/8 — 1/4	−.00024	+.00024	.00048	−.00012	+.00012	.00024	−.00122	−.00063	.00059	−.00063	−.00031	.00032
1/4 — 27/64	−.00033	+.00033	.00066	−.00017	+.00016	.00033	−.00165	−.00087	.00078	−.00087	−.00043	.00044
27/64 — 23/32	−.00043	+.00043	.00086	−.00022	+.00021	.00043	−.00216	−.00119	.00097	−.00119	−.00059	.00060
23/32 — 1 3/16	−.00055	+.00055	.00110	−.00028	+.00027	.00055	−.00274	−.00157	.00117	−.00157	−.00078	.00079
1 3/16 — 1 57/64	−.00068	+.00068	.00136	−.00034	+.00034	.00068	−.00334	−.00196	.00138	−.00196	−.00098	.00098
1 57/64 — 2 61/64	−.00083	+.00083	.00166	−.00042	+.00041	.00083	−.00401	−.00236	.00165	−.00236	−.00118	.00118
2 61/64 — 4 17/32	−.00099	+.00099	.00198	−.00050	+.00049	.00099	−.00472	−.00275	.00197	−.00275	−.00137	.00138
4 17/32 — 6 57/64	−.00118	+.00118	.00236	−.00059	+.00059	.00118	−.00551	−.00315	.00236	−.00315	−.00157	.00158
6 57/64 — 10 7/16	−.00138	+.00138	.00276	−.00069	+.00069	.00138	−.00630	−.00355	.00275	−.00355	−.00177	.00178
10 7/16 — 15 3/4	−.00158	+.00158	.00316	−.00079	+.00079	.00158	−.00709	−.00394	.00315	−.00394	−.00197	.00197

*Limit Plug Gage A is generally used for work on which larger tolerances may be allowed. **Limit

Authentic Data Have Been Released Since November 11, 1918—Cont.

by Arch. & Don. R. Black.)

WINGS AND TAIL DATA—*Continued*											WEIGHT IN LBS.					PERFORMANCE									
AREAS IN SQUARE FEET							Gap, Ft.-In.	Stagger, In.	Sweep-back	Dihe-dral	Emp-ty	Gas and Oil	Use-ful Load	Total Gross	Use-ful Per Cent Gross	Lb. / H.P.	Lb. / Sq. Ft.	HIGH SPEED		Low Speed, M.P.H.	CLIMB		Service or Approx. Ceiling (Feet)	Range at High Speed (Miles)	Year of Production
Wings, Tails	Ailerons	Stabilizer	Elevators	Vertical Fin	Rudder	Non-Skid Planes												M.P.H.	Altitude (Feet)		Minutes	Feet			
215	25.2	17.5	12.5	5.3	6.5	..	4- 0	22	....	1°	892	..	586	1,478	39.7	13.5	6.90	98.0	10,000	49.0	5.6 14.8	5,000 10,000	17,000	318	..
340	36.0	21.0	22.0	9.3	8.3	..	4- 6	11	....	2°	1,630	..	980	2,610	37.5	13.0	7.70	122.0 118.0	5,000 10,000	52.0	6.8 15.0	5,000 10,000	16,000	360	1916- 191
384	33.0	29.0	25.0	9.3	8.3	..	4- 6	24	....	2°	1,709	..	941	2,650	35.5	9.6	7.00	129.5	10,000	49.0	11.0	10,000	23,000	380	..
450	48.0	34.0	29.6	8.0	9.0	..	4- 7	....	....	1½°	2,332	..	1,348	3,680	36.6	10.2	8.20	....	..	54.0	..	..	....	..	..
500	57.0	38.6	29.0	9.0	10.3	..	6- 0	....	....	3°	1,608	..	846	2,454	34.5	16.4	4.90	87.0 78.5	5,000 10,000	37.0	9.0 27.2	5,000 10,000	13,500	380	1917
267	36.0	22.0	16.0	6.4	6.7	..	4- 3	18	....	3½°	1,470	..	560	2,030	27.6	10.2	7.60	121.0 117.0	5,000 10,000	53.0	4.3 9.9	5,000 10,000	22,500	350	..
267	36.0	22.0	16.0	6.4	6.7	..	4- 4	18	....	4°	1,870	..	568	2,438	23.3	12.2	9.10	118.0 115.0	5,000 10,000	58.0	5.0 12.0	5,000 10,000	19,000	240	..
640	93.0	42.0	28.5	..	20.0	..	7- 4	11	....	3°	2,136	..	1,060	3,196	33.2	16.0	5.00	75.0	5,000	40.0	18.0	5,000	12,000	200	..
468	97.0	35.0	25.0	..	13.0	..	6- 0	10	....	2°	1,840	..	860	2,700	31.9	13.5	5.80	98.0	5,000	45.0	10.0	5,000	14,000	290	..
1326	242.0	88.0	74.0	..	21.5	..	10- 0	....	....	3°	5,420	..	3,700	9,120	40.6	22.8	6.90	87.0	5,000	43.0	23.6	5,000	9,500	320	1917
1376	235.0	114.5	63.0	..	21.5	..	10- 0	....	....	3°	6,685	..	3,615	10,300	35.1	19.8	7.50	89.0	5,000	45.0	19.3	5,000	10,500	400	..
1330	242.0	114.5	63.0	..	21.5	..	10- 0	....	....	3°	6,625	..	3,675	10,300	35.7	19.8	7.80	96.0	5,000	45.0	13.5	5,000	11,000	310	1918
1330	242.0	114.5	63.0	27.0	21.5	..	10- 0	....	....	3°	6,700	..	5,800	12,500	46.4	17.9	9.40	98.0	5,000	50.0	15.0	5,000	10,500	1080	..
1330	242.0	114.5	63.0	..	21.5	..	10- 0	....	....	3°	5,560	..	4,040	9,600	42.1	18.5	7.20	94.0	5,000	44.0	13.5	5,000	11,500	540	..
1330	242.0	114.5	63.0	27.0	21.5	..	10- 0	....	....	3°	6,700	..	5,800	12,500	46.4	17.9	9.40	98.0	5,000	50.0	15.0	5,000	10,500	835	..
278	39.6	24.5	17.5	6.8	7.5	..	5- 0	....	....	2½°	1,460	268	673	2,133	31.6	14.2	7.70	108.0	..	50.0	10.0 28.0	5,000 10,000	....	324	..
190	24.0	15.5	9.5	2.1	4.4	..	4-6 to 4- 0	....	....	5° up. 0° low.	746	219	584	1,330	43.9	7.7	7.00	125.0	10,000	50.0	3.5 7.5	5,000 10,000	....	..	..

KEY TO NOTATION USED ON SHEETS OF TABULATED DATA

PQ—Pusher quadruplane
R—Reconnaissance
S—Scout
SP—Sport
SS—Ship scout
T—Training
TA—Transatlantic
TB—Tractor biplane
TPB—Tractor pusher biplane
TPT—Tractor pusher triplane
TF—Trench fighter
TM—Tractor monoplane
TP—Torpedo plane
TT—Tractor triplane
TQ—Tractor quadruplane

Excepting where otherwise stated, all of the machines in the above table are either in production or are built to order.

—Table for Tolerances in Inches

LIMIT SNAP GAGES—*Continued*

SLIDING FIT			PUSH FIT			DRIVING FIT			LIGHT FORCE FIT			FORCE FIT		
Min.	Max.	Tol.	Min.	Max.	Tol.	Min.	Max.	Tol.	Min.	Max.	Tol.	Min.	Max.	Tol.
−.00020	−.00008	.00012	−.00008	+.00012	.00020	+.00012	+.00024	.00012	+.00024	+.00039	.00015	+.00039	+.00059	.00020
−.00031	−.00012	.00019	−.00012	+.00020	.00032	+.00020	+.00035	.00015	+.00035	+.00059	.00024	+.00059	+.00098	.00039
−.00043	−.00016	.00027	−.00016	+.00028	.00044	+.00028	+.00047	.00019	+.00047	+.00083	.00036	+.00083	+.00145	.00062
−.00059	−.00020	.00039	−.00020	+.00032	.00052	+.00032	+.00059	.00027	+.00059	+.00110	.00051	+.00110	+.00197	.00087
−.00078	−.00025	.00053	−.00025	+.00032	.00057	+.00032	+.00071	.00039	+.00071	+.00141	.00070	+.00141	+.00253	.00112
−.00098	−.00031	.00067	−.00031	+.00031	.00062	+.00031	+.00086	.00055	+.00086	+.00176	.00090	+.00176	+.00319	.00143
−.00118	−.00039	.00079	−.00039	+.00027	.00066	+.00027	+.00102	.00075	+.00102	+.00214	.00112	+.00214	+.00394	.00180
−.00137	−.00047	.00090	−.00047	+.00023	.00070	+.00023	+.00118	.00095	+.00118	+.00256	.00138	+.00256	+.00480	.00224
−.00157	−.00056	.00101	−.00056	+.00021	.00077	+.00021	+.00137	.00116	+.00137	+.00303	.00166	+.00303	+.00579	.00276
−.00177	−.00066	.00111	−.00066	+.00020	.00086	+.00020	+.00157	.00137	+.00157	+.00355	.00198	+.00355	+.00689	.00334
−.00197	−.00075	.00122	−.00075	+.00020	.00095	+.00020	+.00177	.00157	+.00177	+.00413	.00236	+.00413	+.00807	.00394

Plug Gage B is used on accurate work necessitating finer tolerances. Compiled by C. E. Johansson, Inc.

TABLE V—Ger

Military Types (Latter Part of the War)

(Compiled for Automotive Indus

Manufacturer and Model	GENERAL						POWER PLANT				WINGS AND TAIL DATA					
	Type	Use	Over-all Dimensions			Crew and Pass.	Engines		Total H.P.	Angle of Incidence		Chord		Span	
			Length, Ft.-In.	Height, Ft.-In.	Width, Ft.-In.		No.	Make		Upper	Lower	Upper, Ft.-In.	Lower, Ft.-In.	Upper, Ft.-In.	Lower, Ft.-In.
A. E. G. G-105	TB Land	B	32- 4	12- 6	60- 2	3	2	Mercedes	520	5°	5°	7- 2	7- 2	60- 2	56-11
Albatross C-III	TB Land	F	26- 0	....	38- 9	2	1	Mercedes	170	....	....	5-11	5- 7	38- 9	36- 8
Albatross C-V	TB Land		30- 0	....	42- 0	2	....		....	....	....	6- 0	6- 0	42- 0	40- 6
Albatross D-III	TB Land	F	24- 0	9- 4	29- 7	1	1	Mercedes	175	....	....	....	....	29- 7	28- 8
Albatross D-V	TB Land	F	23-11	8- 0	29- 6	1	1	Mercedes	180	....	....	....	....	29- 6	28- 6
Fokker D-7	TB Land		22-11	8-10	29- 3	1	1	Mercedes	180	0°	0°	5- 2	3-11	29- 3	25- 5
Fokker Triplane	TT Land	F	18- 1	9- 1	23- 7	1	1	Oberursel Le Rhone	110	2½°	2½°	All Wings 3-3		Up. 23-7	Mid. 20-6	Low 18-9
Fokker-Junkers Armored	TB Land	TF	....	....	50- 0	....	1	Benz	230	....	....	....	....	50- 0		36-2
Friedrichshafen FF-33-J	TB Seaplane	F	34- 0	12- 2	....	2	1	Benz	150	....	....	....	....	55- 0	....	
Friedrichshafen FF-33-L	TB Seaplane	F	29- 5	13- 2	....	2	1	Mercedes	150	....	....	....	....	43- 6	....	
Friedrichshafen FF-41-A	TB Seaplane	TP	45- 0	15- 3	....	2	2	Benz	300	....	....	....	....	72- 6	....	
Friedrichshafen FF-49-C	TB Seaplane	F	38- 1	13- 2	....	2	1	Mercedes	160	....	....	....	....	55- 0	....	
Friedrichshafen G-3	PB Land	B	42- 2	12- 0	78- 0	4	2	Mercedes	520	....	....	7- 8	7- 8	78- 0	78- 0	
Gotha G-0, G-2, G-5	PB Land	B	41- 0	12- 8	77- 0	....	2	Mercedes	520	....	....	7- 6	7- 6	77- 0	71- 9	
Gotha WD-11	TB Seaplane	F	44- 0	15- 6	....	....	2	Mercedes	320	....	....	....	....	73- 8	....	
Gotha Model-12	TB Seaplane	F	32-10	12- 6	49- 2	....	1	Mercedes	160	....	....	....	....	49- 2	46- 0	
Gotha WD-14	TB Seaplane	F	45- 8	15-11	....	....	2	Benz	400	....	....	....	....	79- 6	....	
Halberstadt CL-2	TB Land	F	24- 0	9- 6	35- 3	2	1	Mercedes	180	....	....	5- 3	4- 3	35- 3	34-11	
Halberstadt CL-4	TB Land	F	24- 0	9- 6	35- 3	2	1	Mercedes	180	....	....	5- 3	4- 3	35- 3	34-11	
L. V. G. C-5	TB Land	F	26- 7	10- 6	44- 9	2	1	Benz	225	5° to 3°	5° to 3°	5- 9	5- 3	44- 9	42- 2	
L. V. G. C-6	TB Land		24- 8	....	42- 9	2	1	Benz	230	6½°	5°	5- 3	4- 8	42- 9	....	
Pfalz Pursuit	TB Land	F	23- 2	....	30-10	1	1	Mercedes	175	4½°	4½° to 2½°	5- 5	3-11	30-10	26- 7	
Pfalz D-XII	TB Land	F	21- 5	....	29- 6	1	1	Mercedes	180	3¾°	3¾°	4- 7	4- 7	29- 6	26- 4	
Rumpler C-5	TB Land	G	26-11	9- 9	41- 5	2	1	Maybach or Mercedes	240 260	....	....	5- 8	4- 3	41- 5	40- 0	
Zeppelin Bomber	TPB Land	B	72- 0	21- 0	134- 0	9	4	Maybach	1200	....	....	Tapers 15 to 12		134- 0		134- 0

Commercial

Aviatik F (Limousine)	TB Land	C	25-11	10- 2	49- 2	....	1		300	....	....	....	....	49- 2	....	
Aviatik D-VII	TB Land	SP	20- 0	8- 2	31- 8	....	1	Benz	240	....	....	....	....	31- 8	....	
Aviatik R-III	TPB Land	C	73- 8	21- 4	142-10	24	4	Benz	1000	....	....	....	....	142-10	....	
D. F. W. R-II	TPB Land	C	67- 9	20- 6	114- 9	24	4	Mercedes	1040	....	....	14- 0	14- 0	114- 9	114- 9	
Linke Hoffman R-I	TB Land	C	51- 6	22- 0	109- 6	15	4	Mercedes	1040	....	....	16- 6	15- 6	109- 6	109- 6	
Linke Hoffman R-II	TB Land	C	67- 0	23- 6	138- 6	15	4	Mercedes	1040	....	....	....	....	138- 6	138-	

KEY TO NOTATION USED ON SHEETS OF TABULATED DATA

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F—Fighting
FF—Fire fighting
G—General service (Military)
M—Mail carrier
O—Observation (Military)
P—Passenger
PB—Pusher biplane
PM—Pusher monoplane
PP—Police patrol
PT—Pusher triplane
PQ—Pusher quadruplane
R—Reconnaissance
S—Scout
SP—Sport
SS—Ship scout
T—Training
TA—Transatlantic
TB—Tractor biplane
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TM—Tractor monoplane
TP—Torpedo plane
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man Airplanes

tries by Arch. & Don. R. Black)

WINGS AND TAIL DATA—*Continued*											WEIGHT IN LBS.					PERFORMANCE							
AREAS IN SQUARE FEET							Gap, Ft.-In.	Stagger, In.	Sweep-back	Dihe-dral	Empty	Gas and Oil	Useful Load	Total Gross	Useful per Cent Gross	Lb. / H.P.	Lb. / Sq. Ft.	HIGH SPEED		Low Speed, M.P.H.	CLIMB		Service or Approx. Ceiling (Feet)	Range at High Speed / Mile
Wings, Tails	Ailerons	Stabilizer	Elevators	Vertical Fin	Rudder	Non-Skid Planes												M.P.H.	Altitude (Feet)		Minutes	Feet		
766	35.8	34.0	31.2	11.5	20.8	..	8- 6	0	4° low. 3° up.	2.75° low	5,258	770	1,872	7,130	26.2	13.7	9.80	90.0 / 86.0	.. / 9,000	60.0	10.3 / 23.4	5,000 / 9,000	.....	.....
407	32.5	32.5	14.1	5.4	6.5	..	5- 1	....	0	2°	1,830	..	960	2,790	34.4	16.4	6.9	....	..	..	..	..	.....	.....
440	..	31.0	16.0	8.5	6.5	..	..	....	....	....	..	..	..	..	..	..	....	....	..	..	..	..	.....	.....
227	..	..	..	..	..	..	..	....	....	....	1,510	90	530	2,040	25.5	11.9	9.1	109.0 / 95.0	3,280 / 9,380	..	9.50	13,100	18,000	2.5 hr. at 10,000 ft.
215	..	..	..	..	..	..	..	....	....	....	1,456	..	498	1,954	25.5	10.8	9.1	....	..	..	..	..	....	.....
219	11.4	21.1	15.2	2.8	5.9	..	4- 2	....	0	....	1,540	..	369	1,909	19.3	10.6	8.7	116.6 / 103.5	3,281 / 13,124	..	4.25 / 22.8	3,281 / 13,124	.....	.....
205	..	..	..	..	..	..	..	....	....	....	829	170	430	1,259	34.1	11.1	6.1	....	..	..	17.0	14,800	.....	.....
..	..	..	..	..	..	..	..	....	....	....	2,884	..	846	3,730	22.7	16.2	....	....	..	..	..	..	.....	.....
..	..	..	..	..	..	..	..	....	....	....	2,400	..	1,090	3,490	31.2	23.3	....	75.0	0	50.0	25.0	4,900	.....	.....
..	..	..	..	..	..	..	..	....	....	....	2,140	..	975	3,115	31.2	20.7	....	84.0	0	53.0	30.0	6,560	.....	.....
..	..	..	..	..	..	..	..	....	....	....	5,180	..	2,870	8,050	35.6	26.8	....	75.0	0	53.0	25.0	3,280	.....	.....
..	..	..	..	..	..	..	..	....	....	....	3,380	..	1,430	810	29.8	30.1	....	85.0	0	50.0	30.0	6,560	.....	.....
934	75.2	57.6	32.0	20.0	19.2	..	7- 0	0	6°	1½°	5,930	..	2,717	8,647	31.3	16.6	9.2	....	..	..	..	..	.....	.....
985	109.0	45.0	11.0	16.0	19.0	..	8-6 & 7- 0	0	4°	2°	6,039	1,060	2,722	8,763	31.1	16.8	8.9	87.0	0	..	..	..	.....	.....
1115	..	..	..	..	..	..	..	....	....	....	4,720	1,020	3,160	7,880	40.0	24.6	7.1	75.0	0	..	12.0 / 20.0	3,280 / 4,900	.....	.....
580	..	..	..	..	..	..	..	....	....	....	2,200	..	1,210	3,410	35.5	21.3	5.9	85.0	0	..	7.5 / 19.0	3,280 / 6,560	.....	470
1415	..	..	..	..	..	..	..	....	....	....	6,600	1,720	4,320	10,920	39.5	27.3	7.7	79.0	0	...	17.0 / 38.0	3,280 / 4,900	.....	.....
310	23.2	13.6	12.4	6.4	7.9	..	3-8 to 4- 0	24	4°	2° low.	1,758	240	816	2,574	31.7	14.1	8.2	97.0	10,000	..	9.5 / 24.5	5,000 / 10,000	13,500	.....
310	23.2	13.6	12.4	6.4	7.9	..	4- 0	24	4° up.	2° low.	1,992	220	540	2,532	21.3	14.1	8.2	97.0	10,000	....	9.3 / 24.5	5,000 / 10,000	13,500	.....
429	27.2	21.6	20.8	5.2	6.8	..	5-8 to 5- 5	0	0	1° up. 2° low.	2,188	..	953	3,141	30.3	13.7	7.3	102.0 / 93.0	6,550 / 13,100	..	35.0	13,100	16,400	330
356	22.4	28.0	16.0	5.2	6.8	..	4- 9	10	0	1°	2,090	..	946	3,036	31.2	13.2	8.5	....	..	..	..	..	.....	.....
..	..	..	..	..	..	..	4- 7	16½	....	....	1,580	..	476	2,056	30.1	11.7	....	102.5 / 91.5	10,000 / 15,000	..	17.5 / 41.3	10,000 / 15,000	17,000	.....
239	16.8	16.0	16.8	4.4	8.8	..	4-3 to 4- 6	16	....	1½° lower	..	..	..	..	..	..	....	....	..	..	..	..	.....	.....
264	30.6	22.0	20.8	4.0	6.0	..	6- 0	....	3°	2½°	2,439	..	1,000	3,439	29.1	13.2	9.5	100.5 / 87.0	10,000 / 15,000	..	16.0 / 38.5	10,000 / 15,300	15,500	.....
3400	154.0	250.0	56.0	76.0	43.0	..	14-5 to 11-11	....	0	5½°	18,700	3,200	9,900	28,600	34.6	23.8	8.4	82.0	0	..	..	..	....	877

Types, 1919-1920

..	..	..	..	..	..	..	..	....	....	....	2,318	..	1,247	3,565	35.0	11.9	....	Estimated 105.8	6,560	..	35.0	16,490	21,300	326
..	..	..	..	..	..	..	..	....	....	....	1,645	..	442	2,087	21.2	8.7	....	119.3	9,840	..	24.0	19,680	24,250	.....
..	..	..	..	..	..	..	..	....	....	....	19,870	..	7,930	27,800	28.5	27.8	....	Estimated 77.7	8,200		Estimated 100.0	11,480	13,120	544
2895	115.0	165.0	112.0	24.5	43.0	..	13- 9	0	0	0	18,900	..	7,600	26,500	28.7	25.2	9.0	80.0	..	..	10.0 / 25.0	3,280 / 6,560	.....	.....
2850	..	..	..	..	..	..	14- 3	....	....	....	17,600	..	7,000	24,600	28.4	23.6	8.6	80.0	..	..	120.0	9,900	.....	.....
3440	..	..	..	..	..	..	..	....	....	....	17,600	..	9,000	26,600	33.8	25.6	7.7	80.0	..	..	120.0	11,500	.....	.....

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TP—Torpedo plane
TT—Tractor triplane
TQ—Tractor quadruplane

Mortality Statistics of the Air

This analysis of the wartime fatalities of the airmen of the Allied armies, whether incurred during training or in actual combat, is published for its value as indicating the dangers incurred under abnormal conditions. It is no critirion of the more normal course of events in time of peace.

IN comparing the numbers of pilots in the field, the American Expeditionary Forces suffered the greatest number of fatalities, with 7.74 of the pilots killed in battle as compared with 3.2 of the British pilots killed in battle. These figures, however, are no indication of the mortality statistics when compared on the basis of fatalities to hours flown, and the high percentage is due to the lesser numbers of pilots in the American Expeditionary Forces, and the fact that they were on duty more frequently because of their lesser numbers.

The United States had 37 squadrons in operation in the first and second armies, the flying hours of which, as given in the tables, total 966 hr. per squadron. These units had been at the front for periods varying from one day to several months, and in the short time that the United States was in the war, its squadrons flew practically as many hours as the Belgian Air Service during the entire war.

A comparison of the fatalities occurred in both training and battle during the war shows that the A. E. F. with one mortality to every 1,145 hr. ranked second to France, which suffered but one mortality to every 2,680 hr. during the entire war. The British records for July to December, 1918, show 507 mortalities in 411,345 flying hours, or one death in every 811 flying hours. Italy also had a high fatality record with one death to every 881 hr. during 1918. The American soldiers in England, due perhaps to their stunt training, suffered the high record of one death to every 657 hr. of flying, while in France there was but one death to every 1,279 hr. The record of the American soldiers in Italy which shows but one death in 4,249 flying hours, is due to the fact that there were but 8,497 flying hours spent in that country by American pilots.

The total number of mortalities in the American Air Service in the United States in training in 1918, when the war activities were at their high level, were only 166 mortalities to 486,988 hr. of flying, or one death to every 2,934 flying hours. It is interesting to note that in the year 1918 the United States forces in this country flew 486,988 hr., while Great Britain flew 411,345 hr. in the last half of the year and France, exclusive of advanced and specialized training, operated her training forces but 420,850 hr. during the entire war.

In preliminary training the A. E. F. suffered one fatality to every 2,387 flying hours, the American forces in the United States one fatality to every 2,973 flying hours, France one to every 2,684 hr., Great Britain, one to every 1,993 hr., and Italy one to every 949 flying hours, showing that Italy suffered the greatest number of mortalities in preliminary training, with Great Britain second and the United States third. In advance training Great Britain suffered the greatest number of deaths, due perhaps to the British stunt training. The British records show one death for every 573 flying hours as compared with one death to every 936 flying hours in the A. E. F., one death to every 747 flying hours in Italy and one death to every 2,802 flying hours in the United States in 1918.

None of the flying figures can be considered as a criterion of the course of events in times of peace. Training flights, for example, in times of war constitute short journeys, with a disproportionate number of take-offs and landings to the hour as compared with cross-country flying which would be more the rule in times of peace, and it is in the take-offs and landings that the greatest number of accidents occur. It should also be remembered in reviewing these figures that conditions during the years included have been abnormal, that training was carried on under most exacting circumstances, that there was need for acceleration of pilot and airplane output, that resources were strained to the utmost, and that there was a shortage of suitable training equipment in all countries.

Following are the statistics showing the mortality records of all air services in the Allied armies:

MORTALITY STATISTICS ALL AIR SERVICES

Preliminary Training

Student Pilots*

Nationality	Period	Hrs. flown	Mortalities	Ratio mortalities to hrs. flown
British	July-Dec., 1918	169,406	85	1:1993
Belgian	No data on training			
French	entire war			
	1914–18	420,850[a]	157	1:2680
Italian	1918	91,135	96	1:949
Swiss	1918	3,851[f]	5	1:770
	1917	3,424[f]	3	1:1141
	1916	1,301[f]	1	1:1301
	1915	588[f]	3	1:196
	1914	343[f]	0	0:343
U. S. in Italy	1918	5,853	1	1:5853
U. S. in France	1918	31,762	11	1:2887
U. S. in England	1918	12,913	8	1:1614
U. S. in America	1919	11,781	9	1:1309
	1918	362,706	122	1:2973
	1917[h]	31,352	15	1:2090
	1917[i]	4,716[k]	0	0:4716
	1916	5,337[k]	0	0:5337
	1915	1,814[k]	1	1:1814
	1914	824[k]	1	1:824
	1913	739[k]	5	1:148
	1912	225[k]	1	1:225
	1911	129[k]	1	1:129
Amer. Ex. Force	1917–9	52,515	22	1:2387

* Includes only student pilots; not instructors killed in teaching or any other modifying factor.

a—Obtained by multiplying number of brevets (16,834) by 25, number of hours necessary for first brevet.

f—Assumed to be equivalent to Preliminary.

h—Sept. 1–Dec. 31.

i—To April 28.

k—Accidents of early days, peace time, not proper comparison with present day military training.

MORTALITY STATISTICS ALL AIR SERVICES

All Training—Preliminary, Advanced and Specialized

Nationality	Period	Hrs. flown	Mortalities	Ratio mortalities to hrs. flown
British	July-Dec., 1918	411,345	507	1:811
Belgian	No data on training			
French	entire war 1914–1918	420,850[a]	157	1:2680
Italian	1918	127,745	145	1:881
Swiss	1918	3,851[a]	5	1:770
	1917	3,424[a]	3	1:1141
	1916	1,301[a]	1	1:1301
	1915	588[a]	3	1:196
	1914	343[a]	0	0:343
U. S. in Italy	1918	8,497	2	1:4249
U. S. in France	1918–9	140,787[e]	110	1:1279
U. S. in England	1918–9	23,666	36	1:657
U. S. in America	1919	13,770	11	1:1250
	1918	486,988	166	1:2934
	1917	31,352[c]	15	1:2090
	1917[b]	4,716[f]	0	0:4716
	1916	5,337[f]	0	0:5337
	1915	1,814[f]	1	1:1814
	1914	824[f]	1	1:824
	1913	739[f]	5	1:148
	1912	225[f]	1	1:225
	1911	129[f]	1	1:129
Amer. Ex. Force	1917–9	174,176	152	1:1145[g]

*Includes student pilots only; not instructors killed in teaching or any other modifying factor.

a—Preliminary flying only. No data on advanced and specialized.

b—To April 28.

c—Sept. 1 to Dec. 31.

e—To March, 1919.

f—Accidents of these early days, peace time, not proper comparison with present-day military training.

g—If comparison of A. E. F. ratio is made with U. S. ratio, it should be considered that in the A. E. F. the advanced and specialized training was done on service airplanes of high speed and greater danger than airplanes used in U. S.

BATTLE FATALITIES

Nationality	Period	Pilots only Hrs. flown	Fatalities	Ratio fatalities to hrs. flown	Average per cent of fatalities to pilots in the field
British	July-Oct., 1918	255,842	248	1:1031	3.2
Belgian	1914–18	40,000	43	1:930	no data
A. E. F.	Mar.-Nov., 1918	35,747	106	1:337	7:74

MORTALITY STATISTICS ALL AIR SERVICES

Advanced Training†

Pilots*

Nationality	Period	Hrs. flown	Mortalities	Ratio mortalities to hrs. flown
British	July-Dec., 1918	241,939	422	1:573
Belgian	No data on training			
French	No data on advanced training			
Italian	1918	36,610	49	1:747
Swiss	No data on advanced training			
U. S. in Italy	1918	2,644	1	1:2644
U. S. in England	1918	10,753	28	1:384
U. S. in France	1918–9	109,025	99	1:1101
Amer. Ex. Force	1917–9	121,661	130	1:946
U. S. in America	1919[d]	1,989	2	1:945
	1918	124,282	44	1:2802

* Includes only student pilots; not instructors killed in teaching or any other modifying factor.

† Includes both advanced and specialized.

d—To August 21.

Student Fatality Rates for United States

MORE than 65 per cent of all the flying training of United States aviators was carried on in the United States during 1918, yet during this training more hours were flown per fatality than during any other period excepting that in Italy, where a comparatively small amount of flying was done. In the following table figures for the United States in 1917 are for the last quarter of the year. In comparing the fatality rate in the United States with that for the A. E. F., it should be borne in mind that the A. E. F. training centers were practically our advanced or specialized schools where training was performed on service planes of high speed which involved greater danger than airplanes used in this country.

U. S. Training in	Period	Hours Flown	Fatalities	Hours Flown Per Fatality
United States	1917	35,532	17	2090
" "	1918	486,988	169	2882
" "	1919	13,770	11	1250
Total, U. S.		536,290	197	2771
Italy	1918	8,497	2	4249
France	1918–19	140,787	110	1279
England	1918–19	23,666	36	657
Total, A. E. F.*		174,176	152	1145

*Includes 1226 hours flown and 4 fatalities not distributed by countries.

Chemical Warfare Service Developed Trained Workers

PROBABLY no department of the army organization did more efficient and valuable work and received less publicity and glory for it than the Chemical Warfare Service. Its men were scattered throughout the country delving deep into the mysteries of gases, fuels, dyes and powder. Their work called for the highest degree of efficiency, concentration, accurate knowledge and enthusiasm, and the men in this department supplied these four necessary qualifications in practically every case.

When the war ended, however, and the fighting forces returned from France with tales of the dugout, of trench hardships, of hand-to-hand conflicts, and night patrols, they were, quite justly and naturally, cheered and praised—and given jobs. The men of the Chemical Warfare Service performed a service just as necessary and one which demanded qualities equally as high as those of the doughboy, but their work was not such as to attract popular notice and enthusiasm—the average man listening only to tales of valor on the battlefield.

Realizing these facts, the Chemical Warfare Service has organized for its men a special Employment Bureau under the direction of Major Frederick M. Crossett in Washington, D. C. This bureau has on its list many men who are especially qualified for work in the various branches of the automotive industry. It can supply experts in some sixty different lines of work, chief among which are workers in iron and steel, fuels, gases (not war gases), metallurgy, paints and varnishes, rubber, chemical research, leather, etc.

Any employer who desires men for any work of this kind should write to the Director, Chemical Warfare Service, Employment Bureau, Washington, D. C.

Import Duties on Automotive Products

Country	*Rates*
Abyssinia	10%.
Argentina (a)	C and Tr, 32%; M, $30.88 each; T, $28.02; engine P, $15.41; chassis and C parts, $8.40.
Australia (b)	C, Tr chassis, 10%; M, $58.40 each, or 30%; T, 49c. lb., or 35%; P, 45%.
Austria-Hungary	C, $11.05; Tr, $9.20; M, T, P, $13.81.
Belgium	C, $7; Tr, $5.25; M, $10.51; T, $10.16; P, 13%.
Bolivia	C, 0.6% on appraised value; Tr, 0.6%; M, 40.25%, incl. surtax; T, 0.6%.
Brazil (bb)	C, 15.78%; Tr and P, 12.51%; M, $23.54 each, incl. surtax; T, 28.89%, incl. surtax.
Bulgaria	C and Tr, $57.90 each; M, $15.76; T, $5.25.
Canada	C, Tr, M, T, 42.5%; P, 37.5%-42.5%.
Chile	C, T, P, $9.93; Tr, $3.31; M, $24.83.
Colombia	C, Tr, $0.49; M, $2.43; T, P, $0.97, all incl. surtax.
Costa Rica	C, M, T, P, $4.22; Tr, $1.27.
Cuba	25%.
Denmark	C, Tr, P, $1.22; M, $7.29; T, $6.08.
Dominican Rep	C, 5%; Tr, free; C parts, 5%; Tr parts, free; M, 10%; T, $5.67; T for Tr, free.
Egypt	8% local taxes, ½% at Alexandria.
Finland	C, Tr, P, 10%; M, $11.93 each; T, $18.
France (c)	C, 45%; Tr, 70%; M, $28.46; T, $17.07; P, 70%.
Germany (cc)	C, Tr, $1.62 and $2.70; M, $8.10; T, $6.48.
Greece	C, $3.76; Tr, $1.03, but not more than $53.08 each; M, $8.69 each; T, $1.03; chassis and engines, $0.55; passenger car bodies, $77.70 each.
Guadeloupe (ccc)	C, $19.30 each, less than 4 pass; $38.60 each, 4-pass. or more; Tr, $19.30 each; M,4%; T,6%; P,4%.
Guam	Free.
Guatemala	C, Tr, $4.66; M, $7; T, $7.
Haiti	C, Tr, T, P, 7.9%; M, $2.23 each, incl. surtax.
Hawaii	Free.
Honduras	C, Tr, P, free; M, $13.63; T, $5.45.
India, British	7.5%.
Italy*	C, $77.20 each and $115.80 each; Tr, $1.23; M, $15.44 each; T, $5.25; engine P, $0.96.
Japan (including Formosa)	C, Tr, 35%; M, $46.61 each; T, P, 25%.
Mexico	C, Tr, free; M, $22.59; P, $16.94; Tr tires, $11.29; C tires, $22.59, 12.5%.
Morocco	5%; Colonies, 10%.
Netherlands	49.5%, including surtax.
Newfoundland	C, Tr, M, P, 20%; T, free.
New Zealand	C, Tr, 12%; M, $8.04 each (engine dutiable separately at 10%); T, $3.65; P, 10%.
Norway (d)	C, Tr, M, P, 5.625%; T, $30.62.
Nicaragua	C up to 2205 lb., $2.70; above 2205 lb., $1.62; M, from 220 to 551 lb., $7.56.
Panama	15%.
Paraguay	C, Tr, 62%; M, $67.17 each; T, $60.93.
Persia	10%.
Peru	C, 11% (autos de luxe, 22%); Tr, free; M, 33%; T, $24.28; P, $4.86.
Philippine Islands	Free.
Porto Rico	Free.
Portugal (e)	C, $98 each; 2-pass., $110.58; 4-pass. or more; Tr, $78.40 each, incl. surtax; M, $14.70 each, plus luxury tax; T, $2.66.
Portuguese Colonies	C, $35.25 each; Tr, $9.87 each.
Mozambique	5%.
Roumania (f)	C, $4.46 and $3.06; Tr, $3.06; M, $7.44; T, $9.06; P, $8.75
Salvador	C, Tr, M, P, $2.29; T, $13.81.
Serbia	C, M, 12%; Tr, 10%; T, $10.51; C and M P, 12%; Tr P, 10%.
Siam	3%.
Spain	C, $38.60 each, open; $61.76 each, closed, in addition to duty on chassis; Tr, $3.50; M, $26.26; T, $23.64; C chassis up to 2205 lb., $7.
Sweden	C, Tr, 15%; M, $16.08 each; T, $14.59; P, 10% to 20%.
Switzerland	C, $3.50; Tr, $2.19; M, $3.50; T, $0.70.
Turkey	C, $13.50; Tr, $5; M, $24; T, $15.
Tutuila	10%.
Union of South Africa	C, M, T, P, 20%; Tr, 3%.
United Kingdom (g)	C, M, P, 33.3%; T, free; Tr, free.
United Kingdom, Colonies of	
Aden	Free.
Antigua	13.3%.
Bahamas	C, Tr, 20%; M, 50%; T, P, 25%.
Barbados	C, Tr, M, T, 11.25%; P, 10%.
Bermuda	C, prohibited; M, $1.34 each.
British Guiana	16.5%.
British Honduras	22%.
British North Borneo	10%.
Ceylon	7.5%.
Cyprus	C, Tr, T, P, free; M, 10%.
Dominica	12.5%.
Federated Malay States	10%.
Gibraltar	Free.
Grenada	10%.
Hongkong	Free.
Jamaica	20%.
Malta	5%.
Mauritius	12%.
Montserrat	13.3%.
Nigeria	Free.
St. Christopher and Nevis	11%.
St. Lucia	16.5%.
St. Vincent	17.2%.
Trinidad and Tobago	10%.
Sarawak	Free.
Straits Settlements	Free.
Turks and Caicos Islands	Free.
Zanzibar	7.5%.
Uruguay	C, 24%, incl. surtax; Tr, 24%; M, T, P, 45%.
Venezuela	C, $0.69, incl. surtax; Tr, $0.69; M, $3.43, incl. surtax; T, $10.28, incl. surtax; axles and spring, $0.69; P, $10.28.
Virgin Islands of U. S.	Free.

NOTE.—When percentage mark (%) follows figure, rate of duty is ad valorem. When dollar mark precedes figure, rate is per 100 lb. unless otherwise specified. When only one rate is given it applies to cars, trucks, motorcycles, tires and parts. Abbreviations: C—Cars; Tr—Trucks; M—Motorcycles; T—Tires; P—Parts.

(a) Dutiable on appraised value. If cars are imported knocked down contents of each case must be stated in detail and weight given.

(b) $119.23 each for double-seated open body; $82.73 each, single-seated body; $204.39, canopy tops, e.g., limousine, etc., plus 10% of value of chassis.

(bb) T of pure Para rubber specially marked, 12.51%, incl. surtax.

(c) Tr, up to 5511 lb. in weight. Over 5511 lb., at rate of $5.69; T, pneu., $17.07; solid, $11.38 per 100 lb.; ball bearings, speedometers, dynamos and starting apparatus at pre-war rates, multiplied by coefficients ranging from 1.1 to 3, and determined by the class of articles; other P, 70%.

(cc) C up to 2205 lb., $2.70; above 2205 lb., $1.62; M, from 220 to 551 lb., $7.56.

(ccc) Rates in addition to rates of French tariff.

* First rate C, weighing 1102-2205 lb.; second C, from 2205-6614 lb.

(d) Passenger cars with seats for more than four and trucks suitable for military use may be admitted under prescribed conditions at 5% ad valorem.

(e) An additional luxury surtax of $70 is payable on each complete automobile and of $21 on each motorcycle.

(f) First rate C, weighing 1102-2205 lb.; second, weighing above 2205 lb. There is a special surtax of 2% ad valorem on all goods imported.

(g) The value for duty on cars, trucks and motorcycles includes the cost of freight and insurance, but the value of the tires is to be deducted.

Motorcycles Show Few Radical Changes

Tendency of 1920 models towards refinement in design rather than radical changes—Henderson adopts reverse drive—Two new motorcycles and new bicycle attachment make appearance—Enormous increase in exports

By Archibald Black

(Specially written for AUTOMOTIVE INDUSTRIES.)

THE new models announced for this year show few radical changes when compared with those manufactured last year, although several of the makes show refinements here and there. Possibly the only development that could be classed as radical is the adoption of a reverse gear for the new Henderson. This is a development which the writer has been expecting since the sidecar began to boom several years ago, and it seems safe to predict that other manufacturers will fall in line, within the next year or two, and equip their sidecar models with reverse drives. The tendency for several years past has been towards comfort and still more comfort, and with the large percentage of machines which are being operated with sidecars to-day, it seems only a matter of time when the reverse drive will be at least optional, if not standard equipment, on the "big fellows."

American sidecar manufacturers have not as yet made any great effort to popularize wind shields or tops, such as are now very common in England. These are, however, listed by some enterprising manufacturers, and it would not be surprising to see an effort made to popularize them in the near future. It is interesting to note in this connection that some foreign manufacturers have gone so far along these lines as to market closed sidecars, although such a type would seem to be suitable only for use in connection with low cost "taxi" service. The writer doubts very much if such a design would be at all acceptable to the American public so long as the Ford is available at its present price.

The ever increasing popularity of the sidecar has had the effect of drawing more sharply the division between the lightweight and the "regular" or heavyweight machines. The development will, doubtless, be carried still further, in order to meet on the one hand the demand for a low-priced machine and, on the other, the demand for a powerful machine capable of pulling a full sidecar load up the worst hill. No tendency to depart from the distinctive lines of American motorcycles is shown by any of the new models, nor has the "scooter," which recently took the public's fancy in England, made its appearance here, although there are now several English firms manufacturing these junior motorcycles. Disc wheels, another recent English motorcycle development, have not reached this country.

The Hendee Mfg. Co. has added to its line of Indian motorcycles the Indian Scout, model G-20, listed at $295. This new model is a middleweight with a double-tube frame and replaces the sport model of last year. Outside of a few refinements in detail the Reading-Standard machines are the same as last year. Many of the Excelsior and Henderson parts are now interchangeable, a feature which should be equally popular with riders and dealers. The equipment of the Henderson with a reverse gear, referred to above, probably represents the most radical change shown by any of this year's models. Both the Excelsior and Henderson models are equipped with the new standard 27 x 3½ in. tires. The new Harley-Davidson and Iver Johnson models are very similar to the former models of these concerns. The Cleveland now has foot boards, and some changes have been made which add substantially to its appearance.

Among the changes in the industry it might be noted that one of the old familiar makes is with us no longer, the Independent Pneumatic Tool Co. having discontinued the manufacture of the Thor last year. On the other hand, two new motorcycles and a new bicycle attachment recently made their appearance. The Ace, a new four-cylinder machine, designed by W. G. Henderson, is being manufactured by the Ace Motor Corporation, Erie Street and Sepviva Avenue, Philadelphia. Mr. Henderson is associated in this venture with Max Sladkin, who is also well known to all in the industry. The Yankee, a new two-cycle, single-cylinder machine, is built by the Illinois Motor Co., Lincoln Avenue, Chicago, and the Rollaway, a new bicycle attachment, is built by the Rollaway Co., Toledo.

The records of exports of American-made motorcycles for the twelve months following the signing of the armistice reflect the great development of this branch of the automotive industry, and the curves shown will probably surprise many who have not followed its growth. Motorcycle exports have shown a great and comparatively consistent increase for several years, and everything points to still further growth in future.

Motorcycles in 1919

The motorcycle figures for all States were not obtainable, but careful estimates for the omitted States indicate that the number of motorcycles registered during 1919 varied but little from the 1918 figures. The following table shows the gains and losses of the various States in motorcycle registration during 1919:

Increase in Motorcycle Registration		*Decrease in Motorcycle Registration*	
Minnesota	1,579	District of Columbia	2,060
Texas	1,376	New Jersey	1,140
Mississippi	1,370	Pennsylvania	861
Massachusetts	969	North Dakota	753
Rhode Island	703	New York	609
Iowa	551	Colorado	604
Maryland	521	Kansas	584
Tennessee	333	South Dakota	435
Illinois	154	Nebraska	400
California	151	South Carolina	278
Missouri	151	Ohio	273
North Carolina	122	Florida	213
West Virginia	119	Georgia	153
Maine	107	Idaho	135
Connecticut	104	Indiana	116
Oregon	69	Arizona	89
Vermont	66	Alabama	77
Michigan	57	New Hampshire	31
Kentucky	23	Wisconsin	15
Virginia	106	Delaware	11
		Nevada	6
Total increase	8,631	Montana	5
		Total decrease	8,848

Loss for 1919—217.

(See also table on page 109 for Motorcycle Registration in U. S.)

Detailed Technical Specifications

Compiled for Automotive Indus

NAME OF MACHINE	Model Number	POWER PLANT												TRANSMISSION				
		Cylinders				Piston Displacement (Cu. In.)	Cycle Type	Cooling Type	Lubrication Type	Carburetor Make	Engine Make	Ignition Make and Type	Maximum H.P. Development	Number of Speeds	Gear Ratio to One	Change Speed Gear Type	Clutch Type	Final Drive Type
		Number	Arrangement	Bore (In.)	Stroke (In.)													
Briggs & Stratton Motor Wheel	D	1	Vert.	2½	2½	12.27	4	Air	Splash	Briggs & Stratton	Own.	Own Mag.	2	1	8		None	
Cleveland	20	1	Vert.	2½	2¾	13.00	2	Air	Mix oil with gas.	Schebler	Own.	Berling Mag.	2½	2	10-6	Spur	Mult. Disk	Chain
Evans Power Cycle	E	1	Vert.	2	1¾	5.50	2	Air	Mix oil with gas.	Own	Own.	Berling Mag.	1¼	1	2			Belt from geared crshft
Emblem	106	2	Vee	2⅝	3	32.47	4	Air	Splash	Schebler	Own.	Berling H. T. Mag.	6	3	16-9-3.5	Slid.	Dry Disk	Chain
Excelsior	H-1920	2	Vee	3²¹⁄₆₄	3½	61.00	4	Air	Force	Schebler	Own.	Berling H. T. Mag.	15-20	3	9.9-6.76-4.13	Selec. Slid.	Dry Disk	Chain
Henderson	K	4	Vert.	2¹¹⁄₁₆	3½	79.40	4	Air	Force	Schebler	Own.		22.6	1 Rev. 3 Ford	7.24 Rev. 9.13 Ford 6.85 Ford 4.23 Ford	Selec. Slid.	Oil Disk.	Chain
Harley-Davidson	20-F	2	Vee	3⅛	3½	60.34	4	Air	Force and Splash	Schebler	Own.	Berling or Bosch H.T. Mag.	16	3	9.502 6.335 4.223	Prog. Slid.	Dry Disk	Chain
Harley-Davidson	20-J	2	Vee	3⅛	3½	60.34	4	Air	Force and Splash	Schebler	Own.	Remy	16	3	9.502 6.335 4.223	Prog. Slid.	Dry Disk	Chain
Harley-Davidson	20-W	2	Oppos.	2¾	3	35.00	4	Air	Force and Splash	Schebler	Own.	Berling or Bosch H.T. Mag.	6	3	13.870 8.330 5.000	Prog. Slid.	Oil Disk.	Chain
Indian Powerplus 72	NEP-20	2	Vee	3¼	4⅜	72.60	4	Air	Force and Splash	Schebler	Own.	Aero H. T. Mag.		3	10-6-4	Prog. Slid.	Dry Disk	Chain
Indian Powerplus 72	NP-20	2	Vee	3¼	4⅜	72.60	4	Air	Force and Splash	Schebler	Own.	Aero H. T. Mag.		3	10-6-4	Prog. Slid.	Dry Disk	Chain
Indian Powerplus	NE-20	2	Vee	3⅛	3³¹⁄₃₂	60.88	4	Air	Force and Splash	Schebler	Own.	Aero H. T. Mag.	18	3	10-6-4	Prog. Slid.	Dry Disk	Chain
Indian Powerplus	N-20	2	Vee	3⅛	3³¹⁄₃₂	60.88	4	Air	Force and Splash	Schebler	Own.	Aero H. T. Mag.	18	3	10-6-4	Prog. Slid	Dry Disk	Chain
Indian Powerplus Single	W-20	1	Vert.	3¼	4⅜	33.55	4	Air	Force and Splash	Schebler	Own.	Aero H. T. Mag.	7	3	12-7.2-4.8	Prog Slid.	Dry Disk	Chain
Indian Scout	G-20	2	Vee	2¾	3¹¹⁄₁₆	36.38	4	Air	Force and Splash	Schebler	Own.	Aero H. T. Mag.	11.2	3	12.2-7.7-5	Prog. Slid.	Oil Disk.	Chain
Yankee		1	Vert.	2½	3	14.73	2	Air		Schebler	Own.	Berling Mag.						Belt
Iver-Johnson	16-7 T.S.	2	Vee	3¼	3¾	62.20	4	Air	Force	Schebler	Own.	Bosch Mag.	7-8	2	6.5-3.75	Eclipse 2-Hub Spd.	I-J	Chain
Iver-Johnson	16-7	2	Vee	3¼	3¾	62.20	4	Air	Force	Schebler	Own.	Bosch Mag.	7-8	1	4.25		I-J	Chain
Iver-Johnson	16-4 CTS	1	Vert.	3¼	3¾	31.10	4	Air	Force	Schebler	Own.	Bosch Mag.	4-5	2	6.5-3.75	Eclipse 2-Spd. Hub	I-J	Chain
Iver-Johnson	16-4 C	1	Vert.	3¼	3¾	31.10	4	Air	Force	Schebler	Own.	Bosch Mag.	4-5	1	4.25		I-J	Chain
Iver-Johnson	16-4 B	1	Vert.	3¼	3¾	31.10	4	Air	Splash	Schebler	Own.	Bosch Mag.	4	1			I-J	Belt
Johnson Motor Wheel	R-1920	2	Oppos.	2	1½	9.42	2	Air	Mix oil with gas.	Own	Own.	Quick Action Flywheel Magneto	1¾	1	7.20		None	Chain
Reading-Standard	20-TE	2	Vee	3⅜	4	71.57	4	Air	Splash	Schebler	Own.	Bosch, Berling or Split. H. T. Mag.	16	3	9.20 6.00 3.91	Prog. Slid.	Oil Disk.	Chain
Reading-Standard	20-T	2	Vee	3⅜	4	71.57	4	Air	Splash	Schebler	Own.	Bosch, Berling or Split H. T. Mag.	16	3	9.20 6.00 3.91	Prog. Slid.	Oil Disk.	Chain
Shaw Motorcycle		1		2½	3	14.73	4	Air	Splash	Lunken, Breeze or Schebler	Own.	H. T. Mag.	2.5	1			Oil Disk.	Chain or Belt

British Motor Imports Exceed Exports

THE following figures show the British motor imports and exports and re-exported imports to (1) for November, and (2) for the eleven months ended November 30. The values are in pounds, but can be readily converted into dollars by multiplying by five (pre-war rate).

	November 1919		11 Months ended November, 1919	
Imports	No.	Value	No.	Value
Cars	704	£203,084	3,064	£921,000
Chassis	238	80,268	1,378	385,987
Tires	..	206,180	..	1,731,118
Other parts	..	92,587	..	2,675,569
	942	582,119	4,443	5,713,674
Motorcycles	134	9,259	806	45,763
Tires	..	3,789	..	34,218
Other parts	..	4,792	..	22,623
	134	17,840	806	102,604

	November 1919		11 Months ended November, 1919	
Exports	No.	Value	No.	Value
Cars	198	£152,046	1,296	£937,784
Chassis	84	52,895	569	399,746
Tires	..	245,471	..	2,183,619
Other parts	..	128,970	..	972,219
	282	579,382	1,865	4,493,368
Motorcycles	838	60,868	7,445	512,964
Tires	..	23,410	..	232,242
Other parts	..	30,757	..	294,111
	838	115,035	7,445	1,039,317

# of American Motorcycles for 1920.

tries by Arch. & Don. R. Black

FRAME AND WHEELS								MISCELLANEOUS										
Wheel-base (In.)	Frame Type	Front Forks Type	Tires Size (In.)	Type of Springs		Road Clearance Exclusive of Pedals (In.)	Height of Saddle Above Ground (In.)	Start-ing System	Lighting System	Brakes: Type and Number	Gas Tank Capacity, Gals.	Oil Tank Capacity Qts.	Weight		Speed			List Price, Not Equipped	List Price, Equipped
				Front	Rear								Empty (Lb.)	Ready for Road (Lb.)	Record High (m.p.h.)	Normal High (m.p.h.)	Lowest (m.p.h.)		
.....	.....	.....	20x2	.....	.....	.....	.....	Pedals...	None.....	..None.....	5/8	14 oz.	60¼	.....	28.00	20	3	.....	$80
56	Cleveland Special	Cleveland Spring	26x3	.....	.....	6	28½	Kick....	None.....	1 External.....	Over 2	.....	175	185	55	35-40	3	$225	..
47	Diamond....	Reinforced..	28x1½	.....	.....	8½	32	Pedals...	None.....	1 Morrow Hvy. Serv. Bicycle	¾	.....	70	.....	40	30	3	.....	$125
55	Loop.....	Spring.....	26x2¼	Cushion...	None....	.....	30	Kick....	Gas or Elect....	1 Corbin.....	1½	1½	190	200	50	45	3	....	..
59	Double Tri-angle	Spring.....	27x3½	Helical....	None....	5	31	Kick....	Gas or Elect....	2 Internal and External	3½	3	360	375	80	50	8 on High	$360	$400
60	Susp. Cradle.	Spring.....	27x3½	Helical....	None....	6	36	Kick....	Gas or Elect....	2 Internal and External	3¼	3 in. motor	400	415	80	50	8 on High	$435	$475
59	Loop.....	Helical Spring	28x3	Helical....	None....	4⅞	29½	Kick....	None.....	2 Internal and External	3	4	325	340	97-47	65	3-4	....	$350
59	Loop.....	Helical Spring	28x3	Helical....	None....	4⅞	29½	Kick....	Remy.....	2 Internal and External	3	4	335	350	97-47	65	3-4	....	$370
53½	Keystone....	Trussed Spring	26x3	Helical....	None....	5½	28	Kick....	None.....	1 Internal.....	2¾	2	257	262	68	50	3-4	$325	Not Quoted
59	Loop & Cradle Spring	Leaf Spring..	28x3	Scroll End, ¼ Ell.	Scroll End, ¼ Ell.	8	30½	Kick....	Split, Gem, Wico Batt.	2 Internal and External	3	3	383	395	.....	.....	7 on High	Not Quoted	$415
59	Loop & Cradle Spring	Leaf Spring..	28x3	Scroll End, ¼ Ell.	Scroll End, ¼ Ell.	8	30½	Kick....	None.....	2 Internal and External	3	3	361	386	.....	.....	7 on High	Not Quoted	$385
59	Loop & Cradle Spring	Leaf Spring..	28x3	Scroll End, ¼ Ell.	Scroll End, ¼ Ell.	8	30½	Kick....	Split., Gem., Wico Batt.	2 Internal and External	3	3	378	390	.....	63	5 on High	Not Quoted	$390
59	Loop & Cradle Spring	Leaf Spring..	28x3	Scroll End, ¼ Ell.	Scroll End, ¼ Ell.	8	30½	Kick....	None.....	2 Internal and External	3	3	356	381	75	63	5 on High	$360	.....
59	Loop & Cradle Spring	Leaf Spring..	28x3	Scroll End, ¼ Ell.	Scroll End, ¼ Ell.	8	30½	Kick....	None.....	2 Internal and External	3	3	330	351	.....	58	6 on High	Not Quoted	$325
54	Loop.....	Leaf Spring..	26x3	Flat, ¼ Ell	None.....	5	29½	Kick....	None.....	2 Internal and External	3	3	260	288	57	55	3	$295	.....
.....	.....	Spring.....	26x2¼	Coil.....	.....	.....	.....	.....	.....	1 Eclipse Coaster	.....	.....	.....	.....	.....	.....	.....	.....	.....
58	I-J Truss....	I-J.....	28x3	I-J.....	I-J Spring Seat Post	5	29½	Kick....	None.....	1 Band.....	2½	2	260	.....	.....	.....	.....	.....	.....
58	I-J Truss....	I-J.....	28x3	I-J.....	I-J Spring Seat Post	5	29½	Kick....	None.....	1 Band.....	2½	2	260	.....	.....	.....	.....	.....	.....
58	I-J Truss....	I-J.....	28x3	I-J.....	I-J Spring Seat Post	5	29½	Kick....	None.....	1 Band.....	2½	2	220	.....	.....	.....	.....	.....	.....
58	I-J Truss....	I-J.....	28x3	I-J.....	I-J Spring Seat Post	5	29½	Kick....	None.....	1 Band.....	2½	2	220	.....	.....	.....	.....	.....	.....
58	I-J Truss....	I-J.....	28x3	I-J.....	I-J Spring Seat Post	5	31½	Pedals...	None.....	1 Band.....	2	1½	215	.....	.....	.....	.....	.....	.....
.....	.....	.....	Rear Tire, 26x2	.....	.....	.....	.....	Pedals...	Flywheel Gen.	1 Morrow Coaster	¾	.....	30	.....	41.4	35	5-6	.....	$97.50
58	Keystone....	Helical Spring	28x3	Helical Spring	Spring Seat Post	4¾	30	Kick....	Split. Gen.....	2 Internal and External	3	3	366	.....	75-85	65-70	3	.....	$385
58	Keystone....	Helical Spring	28x3	Helical Spring	Spring Seat Post	4¾	30	Kick....	None.....	2 Internal and External	3	3	343	.....	75-85	65-70	3	.....	$350
.....	Bicycle.....	.....	28x2	None.....	None.....	.....	30	.....	.....	.....	.....	.....	.....	.....	40	.....	.....	.....	.....

*Price is for attachment only.

Foreign re-exportation

	November 1919		11 Months added November, 1919	
	No.	Value	No.	Value
Cars	127	£34,056	299	£91,771
Chassis	15	8,601	80	34,235
Tires	..	5,435	..	109,577
Other parts ...	..	635	..	7,984
	142	48,727	379	243,567
Motorcycles	..	..	4	325
Tires	..	147	..	7,189
Other parts.....	..	..	..	1,490
	..	147	4	9,004

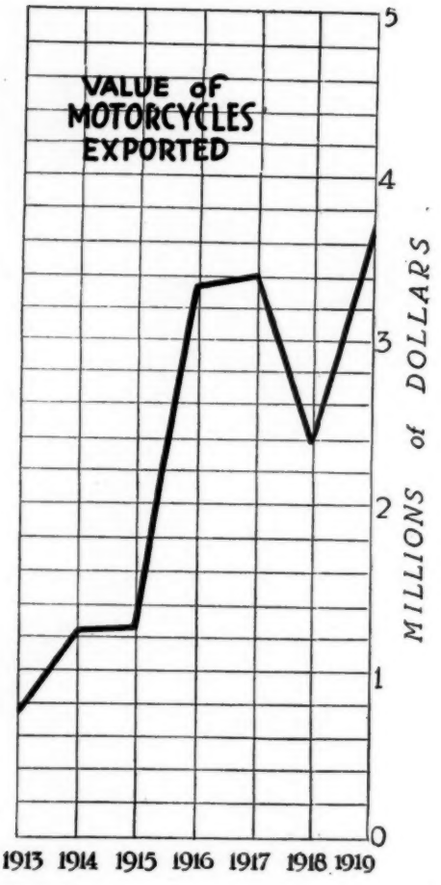
It will be seen that while Great Britain exported only 282 cars and chassis during November, she imported 942 cars and chassis, of which 142 were re-shipped abroad. The corresponding figures for the eleven months show practically a 4 to 1 ratio of imported cars and chassis against the British export of cars and chassis. The motorcycle returns are very much on the other side, and indicate the comparatively small import of motorcycles to Great Britain.

The respective tire values show a more equable competition. The number is not given, but the values show a balance in favor of Great Britain of $197,000 for November and $2,363,500 for the eleven months.

DIRECTOR P. B. KENNEDY, of the Bureau of Foreign and Domestic Commerce, announces the formation of a Western European Division to meet the growing demands of American business for facts on what is regarded as the key position in world trade.

LONDON Special Trades Union Congress has adopted a resolution deferring a decision on the question of the nationalization of mines until February.

Motorcycle Exports



THE value of motorcycles exported during the fiscal year which ended June 30, 1919, was greater than for any previous year. Prior to 1913 the Bureau of Foreign and Domestic Commerce did not compile an individual set of figures for the motorcycle, but included the motorcycle in the bicycle statistics. The total value of motorcycles exported during 1919 was $3,699,336, an increase of $329,720 over 1916, which was previously the highest year in this respect.

The total number of motorcycles exported in 1919, while surpassing the 1918 mark by some four thousand, fell below the records of both 1916 and 1917.

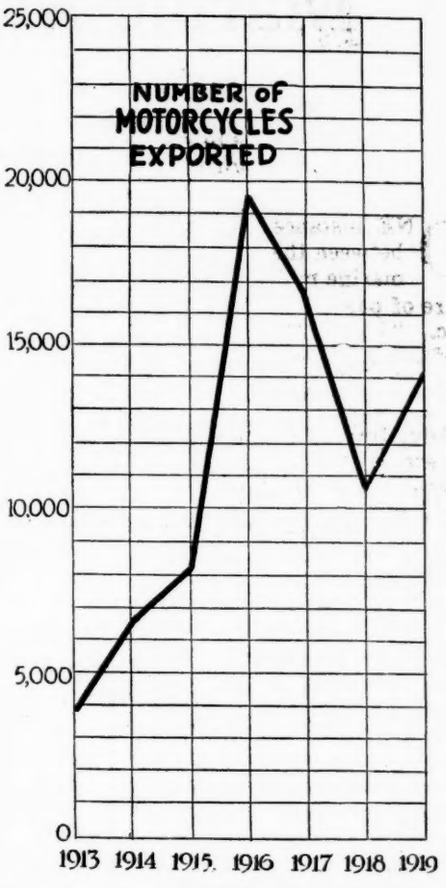
The war year 1916 saw the first big increase in the number and value of motorcycles exported. Early in the war the value of the motorcycle as a means of transportation for war purposes was recognized, and American factories were called upon for large numbers of machines. The prompt response of our manufacturers to the call is shown by the export figures for the war years.

With the ending of the war in sight, the demand fell off somewhat, as is shown by the 1918 figures. It then became necessary to open up new markets to take up the increased production developed by war needs. This increased production is being successfully disposed of to countries which were not involved in the war; more motorcycles are being

	1913	1914	1915	1916	1917	1918	Fiscal Year 1919	Total for All Years
Europe:								
Austria-Hungary	.....	*29*	*7*	.....	.....	.....	.....	*36*
	.....	$5,875	$1,535	.....	.....	.....	.....	$7,410
Azores and Madeira Islands	.....	.....	.....	*1*	.....	.....	.....	*1*
	.....	.....	.....	$228	.....	.....	.....	$228
Belgium	*25*	*65*	*1*	.....	.....	.....	.....	*91*
	$5,176	$11,803	$151	.....	.....	.....	.....	$17,130
Bulgaria	.....	.....	.....	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....	.....	.....	.....
Denmark	*38*	*239*	*149*	*784*	*757*	*2*	*505*	*2,474*
	$6,269	$43,325	$24,163	$128,186	$135,787	$650	$147,818	$486,198
Finland	*21*	*78*	.....	.....	.....	.....	.....	*99*
	$4,479	$13,798	.....	.....	.....	.....	.....	$18,277
France	*39*	*132*	*56*	*216*	*78*	*90*	*27*	*638*
	$8,043	$29,663	$11,573	$26,121	$14,562	$20,946	$7,397	$128,305
Germany	*96*	*231*	*2*	.....	.....	.....	.....	*329*
	$17,525	$48,201	$597	.....	.....	.....	.....	$66,323
Gibraltar	*2*	.....	.....	.....	*3*	.....	.....	*5*
	$338	.....	.....	.....	$495	.....	.....	$833
Greece	.....	*15*	.....	*4*	*1*	*9*	*1*	*30*
	.....	$2,230	.....	$868	$293	$400	$2,088	$5,879
Iceland and Faroe Islands	.....	.....	.....	.....	.....	*8*	*19*	*27*
	.....	.....	.....	.....	.....	$2,000	$5,194	$7,194
Italy	*115*	*342*	*121*	*790*	*1,666*	*1,940*	*1,108*	*6,082*
	$23,298	$70,054	$24,190	$147,223	$349,667	$464,661	$263,828	$1,342,926
Netherlands	*18*	*89*	*348*	*998*	*1,224*	.....	*473*	*3,150*
	$4,570	$17,885	$67,962	$190,512	$237,008	.....	$124,791	$642,728
Norway	*1*	*40*	*114*	*227*	*758*	*86*	*1,048*	*2,274*
	$805	$8,009	$20,656	$41,943	$162,126	$21,414	$302,933	$557,886
Portugal	*16*	*89*	*91*	*197*	*241*	*222*	*188*	*1,044*
	$3,424	$19,014	$18,609	$41,031	$57,981	$56,045	$49,599	$245,703
Roumania	.....	.....	.....	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....	.....	.....	.....
Russia in Europe	*85*	*408*	*649*	*2,103*	*14*	.....	.....	*3,259*
	$17,819	$75,505	$137,771	$494,338	$1,679	.....	.....	$727,112
Serbia, Montenegro and Albania	.....	.....	.....	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....	.....	.....	.....
Spain	*40*	*76*	*122*	*206*	*703*	*426*	*566*	*2,139*
	$9,220	$16,443	$21,472	$36,040	$146,398	$90,162	$154,211	$473,946
Sweden	*14*	*179*	*90*	*457*	*1,059*	*73*	*1,374*	*3,246*
	$3,162	$34,106	$18,556	$88,325	$245,062	$13,071	$419,594	$821,876
Switzerland	.....	*5*	*6*	.....	.....	*2*	*20*	*33*
	.....	$1,229	$1,327	.....	.....	$393	$5,224	$8,173
Turkey in Europe	*1*	.....	.....	.....	.....	.....	.....	*1*
	$262	.....	.....	.....	.....	.....	.....	$262
England	*1,036*	*1,604*	*3,324*	*3,797*	*287*	*28*	*150*	*10,226*
	$203,734	$320,009	$578,836	$732,582	$61,710	$5,706	$41,182	$1,943,759
Scotland	*4*	*16*	*83*	*109*	.....	.....	.....	*162*
	$328	$3,284	$8,393	$21,900	.....	.....	.....	$34,405
Ireland	.....	.....	.....	*50*	.....	.....	.....	*50*
	.....	.....	.....	$10,738	.....	.....	.....	$10,738
North America:								
Bermuda	.....	.....	.....	*1*	.....	.....	.....	*1*
	.....	.....	.....	$250	.....	.....	.....	$250
British Honduras	.....	.....	.....	.....	.....	*1*	*1*	*2*
	.....	.....	.....	.....	.....	$39	$75	$114
Canada	*1,335*	*1,065*	*832*	*927*	*1,064*	*1,041*	*1,489*	*7,753*
	$236,362	$193,987	$140,015	$148,409	$196,645	$198,739	$344,974	$1,459,130
Central American States:								
Costa Rica	*6*	.....	.....	*2*	*3*	.....	.....	*11*
	$1,174	.....	.....	$1,418	$450	.....	.....	$3,042
Guatemala	*3*	*5*	*2*	*4*	*31*	*28*	*14*	*87*
	$671	$1,242	$442	$804	$8,125	$5,033	$3,952	$20,269
Honduras	.....	.....	*5*	*4*	*2*	*2*	.....	*13*
	.....	.....	$1,159	$330	$400	$575	.....	$2,464
Nicaragua	.....	.....	.....	*1*	*2*	*1*	*8*	*12*
	.....	.....	.....	$200	$462	$290	$2,447	$3,399
Panama	*27*	*32*	*59*	*76*	*61*	*62*	*11*	*328*
	$6,238	$7,725	$12,637	$15,387	$15,574	$16,710	$2,839	$77,110
Salvador	*1*	.....	*3*	.....	*8*	*20*	*19*	*51*
	$200	.....	$919	.....	$1,638	$4,458	$5,734	$12,949
Mexico	*48*	*26*	*8*	*51*	*102*	*59*	*29*	*323*
	$9,593	$5,481	$1,897	$9,877	$23,360	$14,622	$8,128	$72,958
Miquelon, Langley & St. Pierre Islands	.....	.....	.....	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....	.....	.....	.....
Newfoundland and Labrador	*3*	*8*	*7*	*12*	*5*	*3*	*3*	*41*
	$717	$1,998	$1,226	$2,505	$1,062	$750	$626	$8,884
West Indies, British:								
Barbados	.....	*6*	*11*	*5*	*11*	*14*	*6*	*53*
	.....	$1,455	$2,585	$757	$2,204	$2,763	$1,556	$11,320
Jamaica	*2*	*7*	*8*	*18*	*32*	*30*	*9*	*106*
	$500	$1,685	$1,625	$3,080	$4,672	$5,237	$1,524	$18,323
Trinidad and Tobago	.....	*16*	*14*	*12*	*26*	*14*	*6*	*88*
	.....	$4,086	$2,833	$2,506	$5,318	$2,452	$1,246	$18,441
Other British	.....	.....	.....	*2*	*10*	*31*	*2*	*45*
	.....	.....	.....	$480	$1,949	$4,167	$601	$7,197
Cuba	*43*	*80*	*76*	*66*	*73*	*165*	*138*	*640*
	$8,285	$15,980	$13,880	$12,217	$15,076	$36,408	$36,952	$138,798
Danish (Virgin Is. of U. S.)	*1*	*4*	.....	.....	.....	.....	*3*	*8*
	$146	$630	.....	.....	.....	.....	$562	$1,338
Dominican Republic	*14*	*2*	.....	*12*	*10*	*10*	*8*	*56*
	$2,945	$376	.....	$1,733	$1,173	$1,029	$1,669	$8,925
Dutch	*1*	*1*	*1*	.....	*2*	*3*	.....	*8*
	$166	$150	$196	.....	$368	$904	.....	$1,784
French	.....	.....	*2*	.....	*5*	*4*	*7*	*18*
	.....	.....	$484	.....	$909	$636	$1,822	$3,842
Haiti	*1*	.....	.....	.....	*4*	*14*	*3*	*22*
	$62	.....	.....	.....	$1,015	$4,026	$440	$5,543
South America:								
Argentina	*163*	*110*	*69*	*111*	*173*	*227*	*220*	*1,153*
	$30,330	$23,470	$12,798	$20,299	$35,929	$48,655	$74,162	$245,643
Bolivia	.....	*1*	.....	*9*	*7*	*11*	*1*	*29*
	.....	$261	.....	$1,606	$1,918	$2,151	$200	$6,136

Covering Seven Years

	1913	1914	1915	1916	1917	1918	Fiscal Year 1919	Total for All Years
South America—Continued:								
Brazil	57 $12,090	61 $10,935	43 $7,743	78 $9,966	88 $16,051	94 $23,387	119 $47,801	549 $127,973
Chile	39 $8,134	37 $7,967	2 $570	14 $2,406	34 $6,389	88 $18,041	56 $13,825	270 $57,332
Colombia	4 $900	9 $2,066	11 $2,359	12 $2,607	11 $2,128	13 $2,472	7 $1,162	67 $13,694
Ecuador	2 $436	6 $852	1 $135	7 $1,493	13 $3,111	11 $2,216	11 $3,144	51 $11,387
Guiana, British	2 $338	8 $1,523	7 $1,356	8 $1,383	30 $5,047	55 $8,828	.....	110 $18,475
Dutch	.....	.....	.....	.....	.....	.....	.....	.....
French	.....	.....	.....	.....	.....	.....	1 $120	1 $120
Paraguay	.....	.....	.....	1 $196	.....	.....	.....	1 $196
Peru	.....	3 $632	3 $847	8 $1,576	25 $4,546	5 $1,103	7 $1,540	51 $10,244
Uruguay	15 $2,921	10 $2,409	.....	21 $4,743	49 $9,207	26 $5,892	61 $14,922	182 $40,094
Venezuela	18 $3,466	93 $4,725	4 $912	4 $456	22 $4,746	2 $573	5 $1,323	78 $16,201
Asia:								
Aden	.....	.....	2 $246	14 $2,431	6 $787	.....	.....	22 $3,464
China	18 $4,542	30 $4,786	25 $6,790	11 $2,562	92 $16,943	.....	238 $45,379	404 $81,002
China, British	.....	.....	.....	.....	.....	77 $13,822	.....	77 $13,822
China, French	.....	.....	.....	.....	.....	.....	.....	.....
China, Japanese	.....	.....	.....	.....	.....	2 $350	13 $2,720	15 $3,070
Chosen (Korea)	6 $1,350	.....	2 $413	7 $1,008	23 $4,852	10 $2,396	6 $1,524	54 $11,543
British India	4 $570	11 $2,404	4 $925	214 $40,388	55 $111,411	16 $3,796	319 $84,463	1,126 $243,957
Straits Settlements	11 $3,349	11 $2,116	.....	11 $1,789	82 $15,773	140 $30,899	61 $14,855	316 $68,281
Other British East Indies	2 $591	7 $1,811	3 $1,211	18 $3,050	140 $26,198	68 $16,192	30 $10,362	268 $59,415
Dutch East Indies	3 $642	20 $4,916	54 $11,871	185 $34,753	1,079 $229,167	251 $50,126	633 $130,176	2,225 $461,651
French East Indies	.....	.....	.....	.....	.....	.....	1 $108	1 $108
Hongkong	.....	1 $325	2 $690	23 $4,353	37 $7,531	18 $3,070	76 $21,092	157 $37,061
Japan	137 $25,833	21 $4,548	14 $3,597	19 $3,191	122 $25,716	384 $78,324	874 $203,335	1,571 $344,544
Persia	.....	.....	.....	.....	.....	2 $730	.....	2 $730
Russia in Asia	.....	1 $115	.....	18 $3,738	21 $5,380	.....	.....	40 $9,233
Siam	.....	3 $648	6 $1,375	6 $1,189	21 $3,626	17 $3,311	25 $5,254	78 $15,403
Turkey in Asia	1 $206	1 $152	.....	.....	.....	.....	2 $591	4 $949
Oceania, British:								
Australia	24 $4,706	786 $132,998	709 $137,269	2,394 $475,157	2,998 $634,011	1,678 $380,786	1,837 $482,658	10,416 $2,247,585
New Zealand	136 $22,664	29 $6,029	333 $49,072	1,576 $282,049	1,108 $236,432	731 $157,432	996 $267,048	4,909 $1,020,726
Other British	.....	.....	11 $1,560	10 $2,120	5 $1,330	1 $267	5 $1,701	32 $6,978
French	6 $1,157	.....	.....	.....	2 $628	4 $1,186	13 $2,689	25 $5,660
German	.....	.....	.....	.....	1 $298	1 $96	.....	2 $394
Philippine Islands	257 $42,052	134 $25,690	135 $29,383	247 $51,276	142 $30,743	163 $35,725	108 $29,510	1,186 $244,379
Africa:								
Belgian Kongo	.....	.....	.....	.....	.....	1 $289	.....	1 $289
British Africa, West	.....	2 $418	2 $396	72 $15,689	29 $3,575	86 $12,336	72 $15,632	263 $48,046
South	40 $6,784	187 $33,659	555 $101,210	1,444 $204,302	1,364 $252,478	1,874 $449,846	885 $240,132	6,049 $1,288,411
East	.....	1 $251	6 $834	69 $12,210	32 $5,033	155 $34,358	133 $38,993	396 $91,679
Canary Islands	.....	2 $493	14 $2,732	9 $2,056	5 $984	.....	.....	30 $6,265
Egypt	.....	4 $739	2 $438	20 $3,559	39 $7,251	.....	.....	75 $11,987
French Africa	.....	.....	.....	.....	1 $432	1 $237	14 $2,672	16 $3,341
German Africa	.....	1 $201	1 $473	.....	.....	.....	.....	2 $674
Liberia	.....	.....	.....	.....	2 $300	.....	.....	2 $300
Madagascar	.....	.....	.....	3 $502	1 $217	.....	.....	4 $719
Morocco	.....	.....	1 $283	1	1 $355	1 $360	.....	3 $998
Portuguese Africa	.....	11 $1,827	5 $999	23 $5,000	4 $1,034	1 $520	4 $1 237	50 $10,617
Spanish Africa	.....	.....	.....	2 $575	.....	3 $638	.....	5 $1,213
Totals: Number	3,983	6,410	8,166	19,500	16,609	10,599	14,124	77,391
Value	$749,072	$1,234,194	$1,494,176	$3,369,616	$3,404,716	$2,364,785	$3,699,336	$16,315,360



sent to markets comparatively new so far as this product is concerned.

Chief among these new markets are the Scandinavian countries, Norway and Sweden. During 1919 a total of $722,587 worth of motorcycles was sold to these two countries alone—a total almost as large as that for all exports in 1913.

China last year bought motorcycles valued at $45,379 after having bought a total of only about $36,000 during the previous five years. Japan, Siam, Brazil, Denmark, Canada and Argentina are other markets which materially increased their purchases of American motorcycles during the last year. These new markets have more than offset the drop in purchases made by the countries which were involved in the war and which became large buyers for war purposes.

The story which these statistics tell is a pleasant one for the motorcycle trade; it reveals for it a bright foreign trade prospect. These new markets, such as China, Japan, Norway, Sweden, etc., have been opened up on a peace-time commercial basis and, consequently, should afford a permanent demand. The countries which were engaged in the war bought heavily for military purposes and, as a result, are probably well supplied with motorcycles for present commercial purposes. The American motorcycle has become known in these countries, however, and they should within a few years again become profitable customers for our export trade.

Marine Motors "Built in U. S. A."

The tables which are published on the eleven pages following contain complete lists of the marine motor manufacturers of the United States, with brief specifications of all models and sizes, revised in December

ONE instance will suffice to show the vast difference between the problems entering into the production of marine motors and those which concern the manufacture of powerplants for motor cars, motor trucks, tractors, etc. The motor vehicle for land use has rather closely defined limits as to size, while a motor boat may be any sort of craft from 14 or 16 ft. in length, with a speed of 7 or 8 miles an hour, to a 150-ft. express cruiser requiring about 1000 hp. to drive her 20 or more miles an hour; and there must also be taken into consideration the motor ship, requiring great power and designed to operate on cheap fuel oil.

With this in view, no other reason is needed to explain the great range in power output of marine motors, nor the diversity of types. Other things to consider in making any comparison between marine motors and powerplants for other automotive service are that the marine motor must be designed to operate constantly at full load, and that all items of equipment must be of such character as to withstand use on salt water. The presence of an unlimited supply of water for cooling purposes is also a consideration which must influence the designer and engineer.

MARINE MOTOR MANUFACTURERS

Total number listed	100
Build Two-stroke exclusively	27
Build Four-stroke exclusively	54
Build both above types	19
Build Diesel, Hvid, Surface Ignition and similar types	22
Average size, Two-stroke	8¾ hp.
Average size, Four-stroke	53 hp.

One hundred manufacturers of marine powerplants are listed in this compilation, including all motor builders of this class in the United States.

An analysis of the tables shows that of these 100 marine motor manufacturers, 54 build motors of the four-stroke type exclusively. Builders of two-stroke marine motors exclusively number 27. Manufacturers who build motors of both two-stroke and four-stroke types number 19. At the present time there are six manufacturers of marine powerplants of the Diesel principle, while 16 manufacturers produce motors which operate upon the surface ignition, semi-Diesel, Hvid or other similar principle.

Digging further into the figures, it is seen that the average size of the marine two-stroke motor available to-day is approximately 8¾ hp., and that the average marine four-stroke motor is one capable of delivering about 53 hp. These averages are based upon the sizes built, and are no indication of the average size or type of motors sold or motors now in use.

Influence of Fuel Cost

Ten years ago the two-stroke motor predominated in the marine field. Rising costs in fuel caused the growth in favor of the more economical four-cycle motor, although the small boat fishermen of the Atlantic coast cling to the simple single or double-cylinder two-stroke type. They find that lower first cost, lower maintenance cost and less need of attention more than compensate for the additional expenditure of fuel in a small powerplant.

Not many years ago the selection of a marine motor was restricted to certain few and well-defined types, and boats frequently were designed more with the view of fitting given motors than were motors chosen to meet the power requirements of specified boats. The present output of marine motors is such that it is possible for the naval architect and the marine engineer to secure a power installation suitable for virtually any hull designed for any kind of service which will meet the requirements as to weight, power, dimensions, shaft revolutions, etc.

The latter item is an additional consideration which does not enter into other automotive installations, for in a marine powerplant there must be a nice relation between the powerplant, the vessel itself and the propelling element, or there can be no expectation of efficiency from the vessel as a whole.

One tendency that is made apparent by the tables is that many more marine motors than formerly are offered as complete, or unit, powerplants. This practice is in keeping with the modern program of standardization, and it cannot be carried too far. The result has been a really noticeable improvement in the performance records of marine motors, for certainly the manufacturer of a motor is in better position to know what equipment and fittings will give most satisfactory results in connection with the motors he builds than the users of that motor, or even the most experienced of naval architects, can be. The manufacturer maintains, or should maintain, a department for the testing of every part and every item of equipment that enters into his product. The buyer of the complete powerplant must benefit through this research by securing a motor every part of which is properly related to every other part.

More Electric Equipment

In keeping with this tendency, we find that electric starting systems are growing more and more common as regular equipment on motors designed for pleasure service, and 36 of the manufacturers listed on the following pages build motors with electric starter-generators as standard equipment, while many others specify this equipment as an option.

The heavier types of motor, including those designed to operate on the cheaper fuel oils, have shown remarkable development during the past two or three years through the production of motors operating on the surface ignition, Diesel, Hvid and other principles. These motors, while they have been developed primarily for service in commercial vessels, are being installed with greater frequency in yachts of the larger classes because of their great economy in operation as compared with gasoline motors, and because refinements accomplished in recent years have made powerplants of this class free from the objections, such as excessive vibration and odor, that eliminated former models of this classification from consideration for yacht service.

Specifications of Marine Motors

These tables are compiled from reports from manufacturers to practically the end of 1919. The prices prevailed at the time the reports were made and are subject to change. The tables indicate the extent of the Marine Motor business and the character of equipment built for the smaller marine units.

ACME ENGINE COMPANY, San Francisco, Cal. — Trade Mark: ACME

TYPE (State here whether Gasoline, Kerosene, Heavy Oil, Diesel, Hvid, Semi-Diesel or Outboard)	Model	H.P. Rating	Two-cycle or Four-cycle	Bore, In.	Stroke, In.	No. of Cyls.	Normal R.P.M.	Weight Complete, Lb.	Ignition System	Make of Carburetor	Make of reverse Gear	Lubrication System	Starting System	List Price
Gasoline, benzine, naphtha, engine distillate, and kerosene. Heavy duty	1920	8	4	6¼	7½	1	360	1,470	Make & Break usually. Jump-spark furnished, if desired.	Schebler	Acme	Manzel force feed and splash feed lubrication.	No starting system—not necessary.	$960.00
	1920	10	4	7¼	9	1	340	1,850						1200.00
	1920	16	4	6¼	7½	2	360	2,250						1760.00
	1920	20	4	7¼	9	2	340	2,925						2200.00
	1920	27	4	8¼	10	2	320	3,975						2970.00
	1920	25	4	6¼	7½	3	375	2,550						2250.00
	1920	35	4	7¼	9	3	350	4,075						3150.00
	1920	45	4	8¼	10	3	325	5,050						4050.00
	1920	55	4	8¾	10½	3	300	6,680						4950.00
	1920	40	4	6¼	7½	4	450	3,475						3200.00
	1920	50	4	7¼	9	4	375	5,160						4000.00
	1920	65	4	8¼	10	4	350	6,675						5200.00
	1920	85	4	8¾	10½	4	325	8,200						6800.00
	1920	65	4	6¼	7½	6	500	4,825						4875.00
	1920	80	4	7¼	9	6	425	6,950						6000.00
	1920	100	4	8¼	10	6	400	8,900						7500.00
	1920	125	4	8¾	10½	6	375	10,800						9375.00
Semi-high speed heavy-duty	1920	22-25	4	6¼	7½	2	500-600	2,150	Jump-spark					1750.00
	1920	35-40	4	6¼	7½	3	500-600	2,450						2250.00
	1920	50-55	4	6¼	7½	4	500-600	3,350						3200.00
	1920	75-80	4	6¼	7½	6	500-600	4,800						4800.00

AEROTHRUST ENGINE COMPANY, La Porte, Ind. — Trade Mark: AEROTHRUST

Gasoline and kerosene	1919	3 & 5	2	2½	2¼	2	250-1600	85	Jump-spark	Holley and Schebler	None	Gravity sight-feed	Magneto	143.75
				3	3½	2	250-1300	115						2 5.00

AMERICAN ENGINE COMPANY, Detroit, Mich. No report received.

ANDERSON ENGINE COMPANY, Chicago, Ill. — Trade Mark: ANDERSON

Gasoline and kerosene	4	4	4	4½	5	1	550	400	Battery	Schebler	Gies	Splash	.....	200.00
	8	8	4	4½	5	2	550	550	Battery	Schebler	Gies	Splash	.....	400.00
	12	12	4	5	6	2	500	1,000	Magneto	Schebler	Paragon	Detroit	.....	600.00
	24	24	4	5	6	4	500	1,600	Magneto	Schebler	Paragon	Detroit	.....	1000.00
	50	50	4	7	8½	4	450	2,900	Magneto	Schebler	Paragon	Detroit	.....	2000.00

ARROW MOTOR & MACHINE COMPANY, Newark, N. J.

Gasoline	K-1	2-3	2	2¾	3	1	800	36	Battery or magneto	Kingston	Joe's	.....	.....	110.00
*Prices for Equipment "C" including bronze propeller, bronze stuffing box, steel shaft, coil to suit, muffler and other small items required for installation. C-16 is complete motor ready for operation.	K-2	5-6	2	2¾	3	2	800	60		Kingston	Joe's	.....	.....	180.00
	A-4	5-6	2	4	4½	1	800	111		Kingston	Joe's	.....	.....	165.00
	C-16	2-3	2	2¾	3	1	800	85	Magneto	Kingston	Joe's	.....	.....	165.00

THE AUTOMATIC MACHINE COMPANY, Bridgeport, Conn. — Trade Mark: THE AUTOMATIC

Gasoline and kerosene	Open base	3	4	4¼	5	1	500	300	Make and break or jump	Schebler or Bennett	Own	Gravity	.....	.....
		6	4	4¼	5	2	500	525			Own	Gravity	.....	.....
		9	4	4¼	5	3	500	760			Own	Gravity	.....	.....
		6	4	5½	7	1	400	643			Own	Gravity or force feed	.....	.....
		12	4	5½	7	2	400	1,115			Own		.....	.....
		18	4	5½	7	3	400	1,425			Own		.....	.....
		24	4	5½	7	4	400	1,800			Own		.....	.....
		25	4	7½	9	2	350	2,625			Own		.....	.....
		37	4	7½	9	3	350	3,465			Own		.....	.....
		50	4	7½	9	4	350	4,430			Own		.....	.....
		75	4	10	14	3	275	8,000			Own		.....	.....
		100	4	10	14	4	275	11,780			Own		.....	.....
Gasoline or kerosene	Enclosed	30	4	5	7	4	550	1,850	Jump spark		Own, Navy, Joe's or Paragon	Force feed	Furnished at extra charge	.....
		45	4	5	7	6	550	2,700	Jump spark			Force feed		.....
		40	4	5½	7	4	550	1,950	Jump spark			Force feed		.....
		60	4	5½	7	6	550	2,900	Jump spark			Force feed		.....
		50	4	6½	8	4	500	3,000	Jump spark			Force feed		.....
		75	4	6½	8	6	500	4,500	Jump spark			Force feed		.....
		70	4	7½	9	4	500	4,000	Jump spark			Force feed		.....
		105	4	7½	9	6	500	6,000	Jump spark			Force feed		.....
		100	4	8½	10	4	500	6,000	Jump spark			Force feed		.....
		150	4	8½	10	6	500	9,000	Jump spark			Force feed		.....

THE BARKER FACTORY, Norwalk, Conn. — Trade Mark: BARKER

Gasoline	A	1¼	2	3⅜	3½	1	500	110	Make and break	Monarch	.....	.....	.....	63.00
Gasoline or kerosene	B	2½	2	4⅛	4¼	1	500	170	Make and break	Barker	.....	.....	.....	85.00
	C	4		4⅝	5	1	475	220	Make and break	Barker	.....	.....	.....	107.00
	D	6½		5½	6½	1	400	350	Make and break	Barker	.....	.....	.....	173.00
	E	10	2	6½	8	1	350	510	Make and break	Barker	.....	.....	.....	250.00
	G	8	2	4⅝	5	2	500	380	Make and break	Barker	.....	.....	.....	204.00

BARBER BROTHERS (King Bros. successors), Syracuse, N. Y. **Trade Mark: BARBER**

TYPE (State here whether Gasoline, Kerosene, Heavy Oil, Diesel, Hvid, Semi-Diesel or Outboard)	Model	H.P. Rating	Two-cycle or Four-cycle	Bore, In.	Stroke, In.	No. of Cyls.	Normal R.P.M.	Weight Complete, Lb.	Ignition System	Make of Carburetor	Make of Reverse Gear	Lubrication System	Starting System	List Price
Gasoline	....	2½	2	3¼	3¼	1	750	75	Jump spark	Schebler	.....	.....	.....	$75.00
	....	5	2	3½	3¼	2	750	140	Jump spark	Schebler	.....	.....	.....	150.00
	....	8	2	3¼	3¼	3	750	190	Jump spark	Schebler	.....	.....	.....	200.00
	....	4	2	4	4	1	600	150	Jump spark	Schebler	.....	.....	.....	120.00
	....	8	2	4	4	2	600	270	Jump spark	Schebler	.....	.....	.....	210.00
	....	12	2	4	4	3	600	390	Jump spark	Schebler	.....	.....	.....	305.00
	....	6	2	4¾	4¾	1	600	245	Jump spark	Schebler	.....	.....	.....	150.00
	....	12	2	4¾	4¾	2	600	375	Jump spark	Schebler	.....	.....	.....	290.00
	....	18	2	4¾	4¾	3	600	500	Jump spark	Schebler	.....	.....	.....	385.00
	....	9	2	5½	5¼	1	500	270	Jump spark	Schebler	.....	.....	.....	180.00
	....	18	2	5½	5¼	2	500	535	Jump spark	Schebler	.....	.....	.....	320.00
	....	27	2	5½	5¼	3	500	675	Jump-spark	Schebler	.....	.....	.....	455.00
	....	12	2	6½	6¼	1	500	400	Jump spark	Schebler	.....	.....	.....	282.00
	....	24	2	6½	6¼	2	500	695	Jump spark	Schebler	.....	.....	.....	483.00
	....	36	2	6½	6¼	3	500	925	Jump spark	Schebler	.....	.....	.....	707.00
	....	40	2	8	8	2	350	1,950	Jump spark	Schebler	.....	.....	.....	630.00
	....	60	2	8	8	3	350	2,850	Jump spark	Schebler	.....	.....	.....	880.00
	....	4	4	3½	5	1	....	160	Jump spark	Schebler	.....	.....	.....	80.00
Aluminum base	V	8	4	3½	5	2	....	....	Jump spark	Schebler	.....	.....	.....	On app.

BALTIMORE OIL ENGINE COMPANY, Baltimore, Md. **Trade Mark: B. O. E. C.**

Kerosene and fuel oil, Wygodsky self-starting crude oil engine	A12	50	4	12¾	18	Single	250	17,000	Heat of compression	None	.....	.....	Self-starting	.....

BEITH MOTOR CO., Providence, R. I. **Trade Mark: BEITH MOTOR**

Gasoline	A	2	2	2¾	2½	1 & 2	775	65	Make and break	Kingston	Joe's	Oil with gasoline	Battery and Sumter magneto	100.00

BOLINDERS COMPANY, 30 Church St., New York, N. Y. **Trade Mark: BOLINDER**

								Tons						
Surface ignition	....	500	-	20½	29½	4	160	55	Surface ignition	.....	Direct reversible	Force feed. Own design	Compressed air	.....
	....	320	2	16½	18⅞	4	225	28	Surface ignition	.....				.....
	....	240	2	14⅛	16⅛	4	250	21	Surface ignition	.....				.....
	....	160	....	16½	18⅞	2	225	14	Surface ignition	.....				.....
	....	120	....	14⅛	16⅛	2	250	11½	Surface ignition	.....				.....
	....	90	....	13	13⅜	2	325	7	Surface ignition	.....				.....
	....	80	....	13	13⅜	2	325	6½	Surface ignition	.....				.....
	....	65	....	11⅞	12¼	2	350	5½	Surface ignition	.....				.....
	....	50	....	10⅝	11	2	375	4½	Surface ignition	.....				.....
	....	40	....	9½	9⅞	2	425	3	Surface ignition	.....				.....
	....	30	....	8½	9	2	450	2½	Surface ignition	.....				.....
	....	40	....	13	13⅜	1	325	5	Surface ignition	.....				.....
	....	32	....	11⅞	12¼	1	350	4	Surface ignition	.....				.....
	....	25	....	10⅝	11	1	375	3	Surface ignition	.....				.....

BRENNAN MOTOR MFG. CO., Syracuse, N. Y. **Trade Mark: BRENNAN STANDARD**

Gasoline	M	17-20	4	4	5	4	1000	650	Two-system:	Optional:	Own	Self-contained	Rear starter	650.00
	B	25-35	4	4½	5	4	800	750	Atwater Kent		Own	pressure feed	electric starter	750.00
	"B" spec.	35-40	4	4½	5	4	1200	700	and high-tension magneto		Own		extra	750.00
	6B	40-50	4	4½	5	6	1200	850			Own			1600.00
	6B Med.	40	4	4½	5	6	750	950			Own			1100.00
	11	30-40	4	5	5	4	1000	850			Own		Starting equipment extra	950.00
	12	35-50	4	5¼	6	4	800	1,100			Own			1200.00
	12	40-80	4	6	6	4	800	1,250			Own			1450.00
	6D	75-100	4	4½	6½	6	1200	800						2000.00

BRIDGEPORT MOTOR CO., INC., Bridgeport, Conn. **Trade Mark: "THE MOTOR THAT MOTES"**

Gasoline or kerosene	40	4½	2	4½	5	1	500	225	Option	Schebler	Option	Option	.....	.....
	50	6	2	5¼	5¼	1	500	260	Option	Schebler	Option	Option	.....	.....
	80	9	2	4½	5	2	500	375	Option	Schebler	Option	Option	.....	.....
	100	12	2	5¼	5¼	2	500	470	Option	Schebler	Option	Option	.....	.....
	243	30	4	6½	7	3	400	1,800	Bosch	Schebler	Paragon	Manzel	.....	.....
	363	45	4	7½	9	3	375	3,200	Bosch	Schebler	Paragon	McCord	.....	.....
	484	60	4	7½	9	4	375	4,000	Bosch	Schebler	Paragon	McCord	.....	.....
Gasoline	142	14	4	5½	6½	2	500	850	Atwater-Kent	Schebler	Paragon	McCord	.....	.....

BUFFALO GASOLENE MOTOR CO., Buffalo, N. Y. **Trade Mark: BUFFALO**

Gasoline or kerosene	....	3-4	4	3	4	2	700	240	Double high	.....	.....	.....	.....	.....
	....	5-6	4	3½	5	2	600	400	tension	.....	.....	.....	.....	.....
	....	16-20	4	3¾	5	4	800	710		.....	.....	.....	.....	.....
	....	25-30	4	4¾	5	4	800	800		.....	.....	.....	.....	.....
	....	40-60	4	5½	7	4	500-800	1,730		.....	.....	.....	.....	.....
	....	50-80	4	6¾	9	4	500-800	2,600		.....	.....	.....	.....	.....
	....	10-12	4	5	6½	2	400	1,170		.....	.....	.....	.....	.....
	....	13-15	4	6	7½	2	350	1,400		.....	.....	.....	.....	.....
	....	20-22	4	7	9	2	350	2,100		.....	.....	.....	.....	.....
	....	20-24	4	5	6½	4	400	1,960		.....	.....	.....	.....	.....
	....	26-30	4	6	7½	4	350	2,525		.....	.....	.....	.....	.....
	....	40-45	4	7	9	4	350	3,655		.....	.....	.....	.....	.....
	....	60-70	4	7	9	6	350	4,850		.....	.....	.....	.....	.....
	....	85-100	4	10	12	4	300	8,200		.....	.....	.....	.....	.....
	....	125-150	4	10	12	6	300	12,800		.....	.....	.....	.....	.....

BURNOIL ENGINE COMPANY, South Bend, Ind. **Trade Mark: BURNOIL**

							Normal and Maximum							
Hvid	....	12½	4	6¾	9	1	425	3,800	None used	None used	Joe's	Madison Kipp	Compressed air	.....
	....	25	4	6¾	9	2	425	4,800	None used	None used	Joe's	Madison Kipp	Compressed air	.....
	....	37½	4	6¾	9	3	425	6,200	None used	None used	Joe's	Madison Kipp	Compressed air	.....
	....	50	4	6¾	9	4	425	7,400	None used	None used	Joe's	Madison Kipp	Compressed air	.....
	....	75	4	6¾	9	6	425	9,700	None used	None used	Joe's	Madison Kipp	Compressed air	.....

BUSCH-SULZER BROS.-DIESEL ENGINE CO., St. Louis, Mo. **Trade Mark: DIESEL**

Diesel	B	120	4	10½	13	4	300	47,000	.....	.....	.....	Force	Compressed air	.....
	B	165	4	11¾	15	4	276	61,000	.....	.....	.....	Force	Compressed air	.....
	B	250	4	13¾	17½	4	257	92,000	.....	.....	.....	Force	Compressed air	.....
	B	365	4	16¾	21	4	225	135,000	.....	.....	.....	Force	Compressed air	.....
	B	520	4	19	24½	4	200	185,000	.....	.....	.....	Force	Compressed air	.....
	CM	650	2	17	27	4	165	....	.....	.....	Own	Force	.....	.....
	CM	1100	2	22	34	4	135	....	.....	.....	Own	Force	.....	.....
	CM	1800	2	28	44	4	105	....	.....	.....	Own	Force	.....	.....
	CMT	1100	2	17	27	6	165	....	.....	.....	Own	Force	.....	.....
	CMT	1850	2	22	34	6	135	....	.....	.....	Own	Force	.....	.....
	CMT	3000	2	28	44	6	105	....	.....	.....	Own	Force	.....	.....

H. L. BROWNBACK CO., Norristown, Pa. — Trade Mark: H. L. B.

TYPE (State here whether Gasoline, Kerosene, Heavy Oil, Diesel, Hvid, Semi-Diesel or Outboard)	Model	H.P. Rating	Two-cycle or Four-cycle	Bore, In.	Stroke, In.	No. of Cyls.	Normal R.P.M.	Weight Complete, Lb.	Ignition System	Make of Carburetor	Make of Reverse Gear	Lubrication System	Starting System	List Price
Gasoline	E	2-3	2	3.25	3	1	900	42	Jump spark	Schebler	.....	In gasoline	.....	$125.00
*Gasoline	G	4	4	2.5	5	2	900	125	Jump spark	Zenith	Optional	Splash	Optional	.....

*Now being designed.

C. N. CADY CO., Canastota, N. Y. — Trade Mark: CADY OF CANASTOTA

Gasoline	....	1½	2	3	2½	1	700	45	Jump spark	Schebler	.....	Gravity and splash	.....	.....
	....	3	2	3⅝	3¾	1	700	90	Jump spark	Schebler	.....		.....	.....
	....	6	2	3⅝	3¾	2	700	135	Jump spark	Schebler	.....		.....	.....
	....	4	2	4⅛	4	1	700	140	Jump spark	Schebler	.....		.....	.....
	....	8	2	4⅛	4	2	700	205	Jump spark	Schebler	.....		.....	.....
	....	12	2	4⅛	4	3	700	275	Jump spark	Schebler	.....		.....	.....
	....	12-16	4	3¾	4	4	1000	300	Jump spark	Air friction	.....		.....	.....

CAILLE PERFECTION MOTOR CO., Detroit, Mich. — Trade Mark: PERFECTION

Gasoline	....	2½	2	3¼	3½	1	200-800	140	Battery	Schebler	Caille	.....	None	$143.00
	....	3½-4	2	3⅞	3½	1	250-800	150	Battery	Schebler	Caille	.....	None	153.00
	....	6	2	4¾	4½	1	250-800	200	Battery	Schebler	Caille	.....	None	196.00
	....	8	2	5¼	5	1	100-500	335	Battery	Schebler	Caille	.....	None	225.00
	....	7-8	2	3⅞	3½	2	250-850	220	Battery	Schebler	.....	.....	None	190.00
	....	14	2	4¾	4½	2	250-750	350	Battery	Schebler	Caille	.....	None	370.00
	....	18-20	2	5¼	5	2	100-600	495	Battery	Schebler	Caille	.....	None	500.00
	....	30	2	4¾	4½	4	100-1000	600	Battery	Schebler	Caille	.....	None	655.00
	....	14	4	3½	4	4	100-950	664	Magneto	Schebler	Caille	.....	North Eastern	540.00
	....	2	2	2⅝	2½	1	700	75	Magneto	Caille	.....	.....	Caille	120.00
	....	2	2	2⅝	2½	1	700	65	Battery	Caille	.....	.....	None	70.00
	....	2	2	2⅝	2½	1	800	50	Magneto	Caille	.....	.....	None	85.00

CHESAPEAKE ENGINE CO., Oxford, Md. — Trade Mark: CHESAPEAKE

Gasoline	L	7	4	5	6	1	475	350	Splitdorf magneto	Schebler	Paragon	Gravity	.....	$275.00
	L	14	4	5	6	2	475	575		Schebler	Paragon	Gravity	.....	550.00
	B	5	2	5	5	1	500	275	Batteries	Schebler	.....	Gravity	.....	150.00
	BB	10	2	5	5	2	500	475	Batteries	Schebler	.....	Gravity	.....	275.00
	....	20	4	4	5	4	575	550	High tension magneto	Schebler	Paragon	Syphon	.....	575.00

CAMDEN ANCHOR-ROCKLAND MACHINE CO., Camden, Me. — Trade Mark: KNOX

Gasoline	D	3	2	4	4	1	600	205	Either magneto and battery or jump spark	Knox	.....	Oil cup, gravity	None	166.00
	D	4½	2	4¼	4½	1	550	250		Knox	.....	Oil cup, gravity	None	180.00
	D	5½	2	5	5¼	1	550	330		Knox	.....	Oil cup, gravity	None	226.00
	D	7½	2	5½	6¼	1	500	500		Knox	.....	Oil cup, gravity	None	273.00
	D	6	2	4	4	2	600	340		Knox	.....	Oil cup, gravity	None	316.00
	D	9	2	4¼	4½	2	550	380		Knox	.....	Oil cup, gravity	None	350.00
	D	11	2	5	5¼	2	550	480		Knox	.....	Oil cup, gravity	None	403.00
	D	15	2	5½	6¼	2	500	760		Knox	.....	Oil cup, gravity	None	521.00
	F	25	4	7	8	2	500	1,900		Knox	.....	Force feed,	None	1660.00
	F	50	4	7	8	4	500	3,300		Knox	.....	Detroit	None	2950.00
	F	75	4	7	8	6	500	4,500		Knox	.....		None	4325.00
Gasoline or kerosene	G	5-6	4	5	5¼	1	500	575	Magneto	Knox	Paragon	Manzel	None	.....
	G	7-8	4	5½	6¼	1	500	700	Magneto	Knox	Paragon	Manzel	None	.....
	G	10-12	4	5	5¼	2	500	950	Magneto	Knox	Paragon	Manzel	None	.....
	G	14-16	4	5½	6¼	2	500	1,100	Magneto	Knox	Paragon	Manzel	None	.....

CLAY ENGINE MFG. CO., Cleveland, O. — Trade Mark: HONEST CLAY

Gasoline-kerosene	....	4	4	4½	5	1	500	385	Batteries	Schebler	Paragon or Joe's	Sight feed	.....	.....
	....	8	4	4½	5	2	500	575	Batteries	Schebler		Sight feed	.....	.....
	R	6	4	5½	7	1	375	675	Batteries	Schebler		Sight feed	.....	.....
	R	8	4	6½	7	1	375	825	Batteries	Schebler		Sight feed	.....	.....
	R	10	4	7½	7	1	375	950	Batteries	Schebler		Sight feed	.....	.....
	R	12	4	5½	7	2	375	1,300	Batteries	Schebler		Sight feed	.....	.....
	R	16	4	6½	7	2	375	1,525	Batteries	Schebler		Sight feed	.....	.....
	R	20	4	7½	7	2	375	1,750	Batteries	Schebler		Sight feed	.....	.....
	R	25	4	5½	7	4	450	2,300	Magneto	Schebler		Manzel	.....	.....
	R	35	4	6½	7	4	450	2,600	Magneto	Schebler		Manzel	.....	.....
	R	50	4	7½	7	4	450	3,000	Magneto	Schebler		Manzel	.....	.....
	O	25-28	4	7½	9	2	375	2,650	Batteries	Schebler		Sight feed	.....	.....
	O	30-35	4	8½	9	2	375	2,800	Batteries	Schebler		Sight feed	.....	.....
	O	38-42	4	8½	10¼	2	375	3,000	Batteries	Schebler		Sight feed	.....	.....
	T	40-50	4	8½	10	2	375	4,000	Magneto	Schebler		Manzel	.....	.....
	T	80-100	4	8½	10	4	375	7,000	Magneto	Schebler		Manzel	.....	.....

COMMONWEALTH MOTORS COMPANY, Chicago, Ill. — Trade Mark: QUAYLE

Hvid Unit Power Plant sold also as separate engine without gear, etc., price $1800.	4-M-28	25-30	4	4¾	6½	4	650	2,150	Ignition secured by heat of compression of air in cylinders	None	Paragon	Detroit force feed lubricator to cylinder walls and force feed pumped to all bearings and to reverse gear	Furnished with or without starter	2000.00 Complete with reverse gear thrust bearing and self-starter

CONSOLIDATED SHIPBUILDING CORPORATION, Morris Heights, New York City, N. Y. — Trade Mark: SPEEDWAY

														Including Electric Starter
Gasoline, high duty	K	22-28	4	4	4½	4	100-1200	560	Berling and Bosch	Kingston and Schebler	Speedway	Splash and force feed	Electric, Bijur	1200.00
(Weights given include electric starter.)	Z	35-44	4	4½	5½	4	100-1200	950			Speedway		Electric, Bijur	1800.00
	Z	50-66	4	4½	5½	6	100-1200	1,200			Speedway		Electric, Bijur	2850.00
	M	130-150	4	5¾	7	6	100-1200	1,900			Speedway		Electric, Bijur	4200.00
	M	175-200	4	5¾	7	8	100-1200	2,350			Speedway		Electric, Bijur	5200.00
Gasoline, medium duty	M	48-75	4	5¾	7	4	600-1000	1,850			Speedway		Electric, Bijur	3000.00
(Weights given include electric starter.)	M	75-130	4	5¾	7	6	600-1000	2,400			Speedway		Electric, Bijur	4000.00
	M	100-175	4	5¾	7	8	600-1000	2,900			Speedway		Electric, Bijur	4850.00
Gasoline, heavy duty, air-starting	L	80-115	4	6¾	8½	6	400-600	5,600			Speedway		Electric, Bijur	6000.00
	H	120-160	4	8½	10	6	400-550	5,900			Speedway		Electric, Bijur	Price on application
	H	200-250	4	11	12	6	350-450	11,400			Speedway		Electric, Bijur	

CURTISS AEROPLANE & MOTOR CORPORATION, New York, N. Y.

TYPE (State here whether Gasoline, Kerosene, Heavy Oil, Diesel, Hvid, Semi-Diesel or Outboard)	Model	H.P. Rating	Two-cycle or Four-cycle	Bore, In.	Stroke, In.	No. of Cyls.	Normal R.P.M.	Weight Complete, Lb.	Ignition System	Make of Carburetor	Make of Reverse Gear	Lubrication System	Starting System	List Price
Gasoline	OX-5	90	4	4	5	8	1400	*390	.....	Duplex, Zenith	.....	Force feed to all bearing	Bijur	.....
*With propeller, hub, without oil or water.	OXX-6	100	4	4¼	5	8	1400	*412	.....	Two Zenith	.....		.....	.....
	K-6	150	4	4½	6	6	1700	*417	.....	Duplex "Ball"	.....	Pressure	.....	.....
	K-12	400	4	4½	6	12	2500	*680	.....	Two Duplex "Ball"	.....	Pressure	.....	.....

DELAWARE MARINE MOTOR CO., Wilmington, Del. — Trade Mark: DUPONT

Gasoline and kerosene	D-F-2	20	4	5	6½	2	750	1,100	High-tension magneto	.....	Carlyle Johnson	Splash	Northeast	§1450.00
	D-F-4	40	4	5	6½	4	750	1,600		.....		Splash	Northeast	1800.00
	D-F-6	60	4	5	6½	6	750	2,150		.....		Splash	Northeast	2250.00

THE H. C. DOMAN CO., Oshkosh, Wis. — Trade Mark: DOMAN

Gasoline and kerosene	B	5-7	4	5	6	1	400-600	500	Jump spark, magneto or battery	Schebler	Paragon	Splash	.....	.....
Medium duty	HM2	12-20	4	4¾	6	2	600-900	700	High-tension magneto	Holley K. V.	Paragon	Force drillshaft	Leece-Neville	.....
Medium duty	HM4	25-40	4	4¾	6	4	600-900	1,200			Paragon	Force drillshaft	Leece-Neville	.....
Heavy duty	T2	20-25	4	6	7	2	400-600	950			Paragon	Force drillshaft	Leece-Neville	.....
Heavy duty	T4	40-50	4	6	7	4	400-600	1,700			Paragon	Force drillshaft	Leece-Neville	.....

DOW PUMP AND DIESEL ENGINE COMPANY, Alameda, Cal. — Trade Mark: DOW

Full Diesel	6-A	320	4	12	18	6	250	125,000	.....	.....	Direct reversible	Ring, Dow, forced	Air	.....
	8-A	425	4	12	18	8	250	165,000	.....	.....			Air	.....
	6-B	500	4	15	22	6	220	185,000	.....	.....			Air	.....
	8-B	667	4	15	22	8	220	240,000	.....	.....			Air	.....
	6-E	1000	4	20	28	6	187	350,000	.....	.....			Air	.....

ERD MOTOR COMPANY, Saginaw, Michigan — Trade Mark: ERD

Gasoline and kerosene	T	30	4	4	6	4	900	750	Magneto	Kingston or Bennett	Standard	Force feed	Leece-Neville or hand	490.00
	A	42	4	4¾	6	4	900	1,100	Magneto		Standard	Force feed		590.00

EVANSVILLE GAS ENGINE WORKS, Evansville, Ind. — Trade Mark: EVANSVILLE

Gasoline (Prices are net.)	Regular	3¾	4	4½	5	1	500	300	Batteries	Schebler	Joe's	Gravity	.....	184.50
	Regular	7½	4	4½	5	2	500	400	Batteries	Schebler	Joe's	Gravity	.....	315.00
	Regular	15	4	4½	5	4	500	625	Magneto	Schebler	Joe's	Force feed	.....	613.50
	Regular	5	4	5	6	1	500	400	Batteries	Schebler	Joe's	Gravity	.....	225.00
	Regular	10	4	5	6	2	500	540	Batteries	Schebelr	Joe's	Gravity	.....	426.00
	Regular	20	4	5	6	4	500	900	Magneto	Schebler	Joe's	Force feed	.....	780.00
	Regular	8	4	6	6¼	1	500	625	Batteries	Schebler	Joe's	Gravity	.....	317.00
	Regular	16	4	6	6¼	2	500	900	Batteries	Schebler	Joe's	Gravity	.....	555.00
	Regular	24	4	6	6¼	3	500	1,200	Batteries	Schebler	Joe's	Gravity	.....	813.00
	Regular	32	4	6	6¼	4	500	1,425	Magneto	Schebler	Joe's	Force feed	.....	1048.00
	Regular	11	4	7	9	1	350	1,150	Batteries	Schebler	Joe's	Gravity	.....	535.00
	Regular	22	4	7	9	2	350	1,800	Batteries	Schebler	Joe's	Gravity	.....	975.00
	Regular	44	4	7	9	4	350	2,900	Magneto	Schebler	Joe's	Force feed	.....	1950.00

EVINRUDE MOTOR COMPANY, Milwaukee, Wisconsin. — Trade Mark: EVINRUDE

Outboard	....	2	2	2⅝	2½	1	800	73	Built-in flywheel magneto	Mixing valve type	Evinrude auto	.....	.....	100.00
	Heavy-duty	3½	2	3¼	3	1	650	116				.....	.....	160.00
	Sport	4	4	2½	2	2	900	109		Kingston		.....	.....	150.00
Inboard	Speed	5	2	2⅝	2½	2	1300	63		Kingston	Johnson	.....	.....	130.00
	....	2	2	2⅜	2½	1	800	45		Mixing valve type	Johnson	.....	.....	75.00

FAIRBANKS, MORSE & CO., Chicago, Ill. — Trade Mark: C-O

Semi-Diesel	C-O	30	2	8½	10	2	400	5,050	Self-igniting	.....	Own	Force feed	Air	.....
	C-O	45	2	8½	10	3	400	6,870	Self-igniting	.....	Own	Force feed	Air	.....
	C-O	60	2	8½	10	4	400	8,000	Self-igniting	.....	Own	Force feed	Air	.....
	C-O	75	2	10½	12½	3	310	14,800	Self-igniting	.....	Own	Force feed	Air	.....
	C-O	100	2	10½	12½	4	310	17,600	Self-igniting	.....	Own	Force feed	Air	.....
	C-O	150	2	14	18	3	250	34,000	Self-igniting	.....	Own	Force feed	Air	.....
	C-O	200	2	14	18	4	250	41,000	Self-igniting	.....	Own	Force feed	Air	.....
	C-O	300	2	14	18	6	250	57,400	Self-igniting	.....	Own	Force feed	Air	.....

FAY & BOWEN ENGINE COMPANY, Geneva, N. Y. — Trade Mark: FAY & BOWEN

Gasoline	L-40†	17	4	3¼	4½	4	1400	450	High-tension magneto	Schebler	Paragon	Circulating splash	Northeast	.....
———	L-41†	22	4	3½	5	4	1200	525		Schebler	Paragon	Constant supply splash	Northeast	.....
†Iron base.	L-41‡	22	4	3½	5	4	1200	450		Schebler	Paragon		Northeast	.....
‡Aluminum base.	LN-42†	20-40	4	4¼	5½	4	900-1400	900		Schebler	Paragon		Northeast	.....
	LN-42‡	20-40	4	4¼	5½	4	900-1400	700		Schebler	Paragon		Northeast	.....
	LN-43†	25-50	4	4¾	5½	4	900-1400	950		Schebler	Paragon		Northeast	.....
	LN-43‡	25-50	4	4¾	5½	4	900-1400	750		Schebler	Paragon		Northeast	.....
	L-44†	30-45	4	5	6¼	4	600-1000	1,095		Schebler	Paragon	Force feed	Northeast	.....
	L-44‡	30-45	4	5	6¼	4	600-1000	800		Schebler	Paragon	Force feed	Northeast	.....
	L-63†	30-50	4	4½	5½	6	900-1000	1,275		Schebler	Paragon	Force feed	Northeast	.....
	L-63‡	30-50	4	4½	5½	6	600-1000	900		Schebler	Paragon	Force feed	Northeast	.....
	L-64†	45-75	4	5	6¼	6	600-1100	1,480		Schebler	Paragon	Force feed	Northeast	.....
	L-64‡	45-75	4	5	6¼	6	600-1100	1,200		Schebler	Paragon	Force feed	Northeast	.....

FRAZER BROS. CO., Adams, N. Y. — Trade Mark: FRAZER-ADAMS

Gasoline	....	2	2	3⅛	3	1	200-1000	70	Jump spark		.....	Mix in gasoline	.....	.....
	....	4	2	3⅛	3	2	200-1000	130	Jump spark		.....	Mix in gasoline	.....	.....
	....	5	2	3¾	4¼	1	200-1000	140	Jump spark		.....	Mix in gasoline	.....	.....
	....	10	2	3¾	4¼	2	200-1000	220	Jump spark		.....	Mix in gasoline	.....	.....

THE FRISBIE MOTOR CO., Middletown, Conn. — Trade Mark: FRISBIE

Gasoline or kerosene	A	5	4	4¾	5	1	550	325	*	Schebler, Kingston and Stromberg	Paragon	†	‡	302.50
———	C	7	4	6	6	1	450	500			Paragon			385.00
*Atwater-Kent on multiple cylinder, timer and coil on one-cylinder. High-tension magneto furnished extra. Make and break can be furnished extra.	B	10	4	4¾	5	2	550	430			Paragon			512.50
	D	16	4	6	6	2	475	700			Paragon			732.50
	R	18	4	4¾	5	3	650	650			Paragon			800.00
	N	25	4	6	6	3	600	1,050			Paragon			1000.00
	E	30	4	4¾	5	4	800	725			Paragon			900.00
†Manzel or Detroit force feed on multiple cylinder engines. Ring oilers on crank.	F	40	4	6	6	4	600	1,200			Paragon			1275.00
	K	50	4	4¾	5	6	850	985			Paragon			1600.00
	L	75	4	6	6	6	800	1,600			Paragon			1875.00
‡Leece-Neville extra, all models, $250.00.														
§Prices are for gasoline engines and are subject to change.														

FULTON MFG. CO., Erie, Pennsylvania — Trade Mark: FULTON

TYPE (State here whether Gasoline, Kerosene, Heavy Oil, Diesel, Hvid, Semi-Diesel or Outboard)	Model	H.P. Rating	Two-cycle or Four-cycle	Bore, In.	Stroke, In.	No. of Cyls.	Normal R.P.M.	Weight Complete, Lb.	Ignition System	Make of Carburetor	Make of Reverse Gear	Lubrication System	Starting System	List Price
Diesel	....	50	4	8	9	3	400	9,000	Straight Diesel	None	Paragon	Force feed	Air	.....
	....	70	4	8	9	4	400	10,000	Straight Diesel	None	Paragon	Force feed	Air	.....
	....	100	4	8	9	6	400	13,000	Straight Diesel	None	Paragon	Force feed	Air	.....

THE GAETH MOTOR CO., Cleveland, Ohio. — Trade Mark: GAETH

Gasoline and kerosene	C.O.	14–18	4	5½	8	2	400–600	1,450	High tension	Stromberg	Paragon	Force feed,	Fisher Electric	$900.00
	C.O.	20–27	4	5½	8	3	400–600	1,800	High tension	Stromberg	Paragon	own		1200.00
	C.O.	28–36	4	5½	8	4	400–600	2,100	High tension	Stromberg	Paragon			1500.00
	C.O.	42–54	4	5½	8	6	400–600	3,000	High tension	Stromberg	Paragon			2400.00
	H.C.	14–18	4	5½	8	2	400–600	1,450	Make and break	Stromberg	Paragon			1000.00
	H.C.	20–27	4	5½	8	3	400–600	1,800	Make and break	Stromberg	Paragon			1350.00
	H.C.	28–36	4	5½	8	4	400–600	2,100	Make and break	Stromberg	Paragon			1700.00
	H.C.	42–54	4	5½	8	6	400–600	3,000	Make and break	Stromberg	Paragon			2300.00
	E.C.	36–50	4	5½	8	4	600–800	1,300	High tension	Stromberg	Paragon			1800.00
	E.C.	54–75	4	5½	8	6	600–800	2,200	High tension	Stromberg	Paragon			2800.00
	E.C.	36–50	4	5½	8	4	600–800	2,000	Make and break	Stromberg	Paragon			2000.00
	E.C.	54–75	4	5½	8	6	600–800	3,000	Make and break	Stromberg	Paragon			3000.00

J. S. GAFFGA & CO., Greenport, N. Y. — Trade Mark: GAFFGA

Gasoline	A	3	2	4	4	1	550	225	Make and break	Schebler	Paragon	Gravity feed	.....	.....
	....	4	2	4⅝	5	1	500	325	Make and break	Schebler	Paragon	Gravity feed	.....	.....
	....	5	2	5	5½	1	475	350	Make and break	Schebler	Paragon	Gravity feed	.....	.....
	....	6	2	5½	6	1	450	425	Make and break	Schebler	Paragon	Gravity feed	.....	.....
	....	8	2	6	6½	1	400	475	Make and break	Schebler	Paragon	Gravity feed	.....	.....
	....	6	2	4	4	2	550	375	Make and break	Schebler	Paragon	Gravity feed	.....	.....
	....	8	2	4⅝	5	2	500	425	Make and break	Schebler	Paragon	Gravity feed	.....	.....
	....	10	2	5	5½	2	475	525	Make and break	Schebler	Paragon	Gravity feed	.....	.....
	....	12	2	5½	6	2	450	700	Make and break	Schebler	Paragon	Gravity feed	.....	.....
	....	16	2	6	6½	2	400	850	Make and break	Schebler	Paragon	Gravity feed	.....	.....

GRAND RAPIDS GAS ENGINE CO., Grand Rapids, Mich. — Trade Mark: MONARCH

Gasoline and kerosene	....	5–45	4	5	6	1–6	525–575	....	Jump spark or	Schebler	Own	Force feed	Special	.....
	....	7–60	4	6	7	1–6	525–575	....	make and	Schebler	Own	Force feed	Special	.....
	....	72	4	8	9	4	375–500	....	break	Schebler	Own	Force feed	Special	.....
	....	40–168	4	10	10	2–6	325–450	....		Schebler	Own	Force feed	Special	.....

GRAY MOTOR CO., Detroit, Mich. — Trade Mark: GRAY

Gasoline	U	3	2	3½	3½	1	375–1300	90	Jump spark	Schebler	Joe's or Gies	Through	.....	.....
	U	5½	2	4¼	4½	1	700–1100	170	Jump spark	Schebler	Joe's or Gies	gasoline	.....	.....
	U	6	2	3½	3½	2	700–1100	138	Jump spark	Schebler	Joe's or Gies		.....	.....
	X-V	20–25	4	3½	5	4	500–1200	650	Magneto	Stromberg	Joe's	Force feed and	Option	.....
	E	25–35	4	4	6	4	500–1000	800	Magneto	Stromberg	Paragon	splash	Option	.....
	E	35–45	4	4¾	6	4	500–1000	1,100	Magneto	Stromberg	Johnson		Option	.....

THE GRAY & PRIOR MACHINE CO., Hartford, Conn. — Trade Mark: HARTFORD (2 Cycle) GRAY-PRIOR (4 Cycle)

Gasoline	X	5	2	4	4½	1	700	330	Make and break	Schebler	None	Oil in gasoline	None	270.00
Hartford (2-cycle)	X	8	2	4½	4½	1	700	335	Make and break	Schebler	None	Oil in gasoline	None	300.00
	X	10	2	5	5¼	1	700	440	Make and break	Schebler	None	Oil in gasoline	None	375.00
	X	20	2	5	5¼	2	700	620	Make and break	Schebler	None	Oil in gasoline	None	550.00
Gray-Prior (4-cycle): Kerosene and gasoline	D-4	36	4	4½	8	4	700	1,950	Jump spark	Kingston	Own make	Force feed	None	1430.00

HALL-SCOTT MOTOR CAR CO., INC., Berkeley, Cal. — Trade Mark: HALL-SCOTT

Gasoline	L-M-4	125	4	5	7	4	1700	1000	Delco	Multiple jet	Paragon	Hall-Scott	Delco	.....
	L-M-6	200	4	5	7	6	1700	1245	Delco	Multiple jet	Paragon	force feed	Delco	.....

HETTINGER ENGINE CO., Bridgeton, N. J. — Trade Mark: HETTINGER

Gasoline	6 H.P.	12	4	4½	6	1	460	400	Make and break	Schebler	Paragon	Gravity	.....	.....
	12	12	4	5½	6	2	450	650	Make and break or jump	Schebler	Paragon	Gravity	.....	.....
	18	18	4	6½	8	2	400	1,500	Jump	Schebler	Hettinger	Mechanical	.....	.....
	25	25	4	7½	9	2	350	2,000	Jump	Schebler	Hettinger	Hettinger	.....	.....
	36	36	4	6½	8	4	400	3,000	Jump	Schebler	Hettinger		.....	.....
	50	50	4	7½	9	4	350	4,500	Jump	Schebler	Hettinger		.....	.....

J. V. B. ENGINE CO., Akron, Ohio. — Trade Mark: J. V. B.

Gasoline, kerosene	A4	28–38	4	4¾	6	4	600–900	1,150	Magneto with	Schebler	J. V. B. multiple disc	J.V.B., force feed	Leece-Neville	1000.00
Petrol, paraffin	A4R	45–60	4	4¾	6	4	1000–1450	1,150	impulse starter				Leece-Neville	1000.00

JACOBSON GAS ENGINE CO., Albany, N. Y. — Trade Mark: JACOBSON

Heavy oil	....	20	2	8½	10	1	410	2,500	Surface	.....	Navy	Detroit force	Air	.....
	....	25	2	9½	10	1	410	2,700	Surface	.....	Navy	feed	Air	.....
	....	30	2	10½	11	1	375	3,400	Surface	.....	Navy		Air	.....
	....	35	2	11	13	1	340	4,500	Surface	.....	Navy		Air	.....
	....	40	2	12	13	1	340	5,000	Surface	.....	Navy		Air	.....
	....	40	2	8½	10	2	410	4,750	Surface	.....	Navy		Air	.....
	....	50	2	9½	10	2	410	5,100	Surface	.....	Navy		Air	.....
	....	60	2	10½	11	2	375	5,650	Surface	.....	Navy		Air	.....
	....	70	2	11	13	2	340	8,200	Surface	.....	Navy		Air	.....
	....	80	2	12	13	2	340	8,800	Surface	.....	Navy		Air	.....
	....	60	2	8½	10	3	410	6,300	Surface	.....	Navy		Air	.....
	....	75	2	9½	10	3	410	6,700	Surface	.....	Navy		Air	.....
	....	90	2	10½	11	3	375	7,500	Surface	.....	Navy		Air	.....
	....	105	2	11	13	3	340	9,700	Surface	.....	Navy		Air	.....
	....	120	2	12	13	3	340	10,300	Surface	.....	Navy		Air	.....
	....	80	2	8½	10	4	410	7,400	Surface	.....	Navy		Air	.....
	....	100	2	9½	10	4	410	7,800	Surface	.....	Navy		Air	.....
	....	120	2	10½	11	4	375	9,200	Surface	.....	Navy		Air	.....
	....	140	2	11	13	4	340	11,500	Surface	.....	Navy		Air	.....
	....	160	2	12	13	4	340	12,600	Surface	.....	Navy		Air	.....

THE CARLYLE JOHNSON MACHINE CO., Manchester, Conn. — Trade Mark: BUD-E

Gasoline	Bud-E	3	2	3	3	2	1200	110	Cuno timer or Bosch magneto	Schebler	No. 0 Carlyle Johnson	Sight feed or oil in gasoline	Rear starter by hand	250.00

THE KOBAN MFG. CO., Milwaukee, Wis. — **Trade Mark: KOBAN (Outboard)**

TYPE (State here whether Gasoline, Kerosene, Heavy Oil, Diesel, Hvid, Semi-Diesel or Outboard)	Model	H.P. Rating	Two-cycle or Four-cycle	Bore, In.	Stroke, In.	No. of Cyls.	Normal R.P.M.	Weight Complete, Lb.	Ignition System	Make of Carburetor	Make of Reverse Gear	Lubrication System	Starting System	List Price
Gasoline, outboard	G	3	2	2⅝	2⅜	2	800-900	80	Magneto battery	Koban	Reverses on spark	Lubricating oil mixed with gasoline	.....	$125.00 110.00

KAHLENBERG BROS. CO., Two Rivers, Wis. — **Trade Mark: KAHLENBERG**

Gasoline-kerosene	1919	2-3	2	3½	3½	1	600	125	Make and break	Kahlenberg	Reversing engine	Force feed	.....	.....
	1919	3-4	2	4	4	1	550	160	Make and break	Kahlenberg		Force feed	.....	.....
	1919	4-6	2	5	5	1	400	400	Make and break	Kahlenberg		Force feed	.....	.....
	1919	6-8	2	5½	6	1	400	550	Make and break	Kahlenberg		Force feed	.....	.....
	1919	9-12	2	6½	7	1	350	750	Make and break	Kahlenberg		Force feed	.....	.....
	1919	12-15	2	7	8	1	325	900	Make and break	Kahlenberg		Force feed	.....	.....
	1919	6-8	2	4	4	2	550	350	Make and break	Kahlenberg		Force feed	.....	.....
	1919	8-12	2	5	5	2	400	650	Make and break	Kahlenberg		Force feed	.....	.....
	1919	12-16	2	5½	6	2	380	950	Make and break	Kahlenberg		Force feed	.....	.....
	1919	18-24	2	6½	7	2	350	1,300	Make and break	Kahlenberg		Force feed	.....	.....
	1919	24-30	2	7	8	2	325	1,800	Make and break	Kahlenberg		Force feed	.....	.....
	1919	30-36	2	7¾	8	2	325	2,000	Make and break	Kahlenberg		Force feed	.....	.....
	1919	50-55	2	9	10	2	300	3,400	Make and break	Kahlenberg		Force feed	.....	.....
	1919	27-36	2	6½	7	3	325	1,700	Make and break	Kahlenberg		Force feed	.....	.....
	1919	36-45	2	7	8	3	325	2,600	Make and break	Kahlenberg		Force feed	.....	.....
	1919	45-54	2	7¾	8	3	325	2,800	Make and break	Kahlenberg		Force feed	.....	.....
	1919	75-85	2	9	10	3	300	5,000	Make and break	Kahlenberg		Force feed	.....	.....
Oil engines	1919	70	2	....	....	2	340	8,500	Hot bulb	.....	.....	Force feed	.....	.....
	1919	100	2	....	....	3	340	10,000	Hot bulb	.....	.....	Force feed	.....	.....
	1919	130	2	....	....	4	340	15,000	Hot bulb	.....	..	Force feed	.....	.....

KEMP MACHINE WORKS, Muncie, Ind. — **Trade Mark: AIRDRIVE**

Gasoline, outboard	L-2	3	4	2	2½	2	2100	67	Dixie high-tension magneto	Own	.....	Splash	.....	160.00
	M-2	10	4	4	3⅞	2	1400	122	Flywheel type, high-tension magneto	Schebler	.....	Splash	.....	220.00
Gasoline motor	O-4	24	4	3¾	4½	4	1100	575	High-tension magneto, Kingston	Schebler	.....	Splash and force feed	.....	785.00
Transmission and air propeller.. (For 4-cycle marine motors)	O-4	15-35	....	....	....	..	....	....	.....	.....	.....	.....	.....	360.00

KERMATH MFG. CO., Detroit, Mich. — **Trade Mark: KERMATH**

Gasoline or kerosene	12	10-12	4	3½	4	4	600-1200	470	Atwater-Kent,	Kingston	Own	Splash	Wagner	450.00
	16	16-18	4	3¾	4	4	600-1200	490	Kingston,	Kingston	Own	Splash	Wagner	485.00
	20	20-25	4	4	4	4	600-1200	510	Bosch or Eisemann magnetos	Kingston	Own	Splash	Wagner	525.00
	40	24-40	4	4½	6¼	4	600-1000	1,350	Bosch	Kingston	Navy special	Own, hollow crankshaft	Leece-Neville	1500.00

KNOX MOTORS CO., Springfield, Mass. — **Trade Mark: KNOX-VALVE in Head**

Gasoline-kerosene	350	40-46	4	5	5½	4	825	950	Bosch magneto and battery with coil and distributor	Stromberg	Paragon	Force feed	Gray & Davis	1300.00

J. W. LATHROP COMPANY, Mystic, Conn. — **Trade Mark: LATHROP**

Gasoline or kerosene	1920	3	2	4	4	1	500	....	Either make	Schebler	Paragon	Gravity oil	.....	.....
	1920	4	2	4½	5	1	500	....	and break or	Schebler	Paragon	cups, oil pumps	.....	.....
	1920	5	2	5⅜	5	1	500	....	jump spark	Schebler	Paragon	and oil in gaso-	.....	.....
	1920	6 Lt.	2	5½	5	1	500	....		Schebler	Paragon	line. Three sep-	.....	.....
	1920	6 St.	2	5¼	6½	1	400	....		Schebler	Paragon	arate systems	.....	.....
	1920	7	2	6	6½	1	375	....		Schebler	Paragon	independent of	.....	.....
	1920	8	2	6½	6½	1	375	....		Schebler	Paragon	each other	.....	.....
	1920	10	2	7	7½	1	300	....		Schebler	Paragon		.....	.....
	1920	12	2	7½	7½	1	275	....		Schebler	Paragon		.....	.....
	1920	8	2	4½	5	2	550	....		Schebler	Paragon		.....	.....
	1920	10	2	5⅛	5	2	500	....		Schebler	Paragon		.....	.....
	1920	12 Lt.	2	5½	5	2	500	....		Schebler	Paragon		.....	.....
	1920	12 St.	2	5¼	6½	2	400	....		Schebler	Paragon		.....	.....
	1920	14	2	6	6½	2	400	....		Schebler	Paragon		.....	.....
	1920	16	2	6½	6½	2	400	....		Schebler	Paragon		.....	.....
	1920	20	2	7	7½	2	300	....		Schebler	Paragon		.....	.....
	1920	24	2	7½	7½	2	275	....		Schebler	Paragon		.....	.....
	1920	36	2	7½	7½	3	275	....	Jump spark	Schebler	Paragon		.....	.....
	1920	12	4	5⅛	6½	2	450	....	Jump spark	Kingston	Paragon	Positive pres-	.....	.....
	1920	16	4	5½	6½	2	450	....	Jump spark	Kingston	Paragon	sure oiling sys-	.....	.....
	1920	21	4	5⅝	6½	3	500	....	Jump spark	Kingston	Paragon	tem	.....	.....
	1920	30	4	5½	6½	3	700	....	Jump spark	Kingston	Paragon		.....	.....
	1920	28	4	5⅝	6½	4	500	....	Jump spark	Kingston	Paragon		.....	.....
	1920	40	4	5½	6½	4	700	....	Jump spark	Kingston	Paragon		.....	.....

LEWIS MOTOR MANUFACTURING CO., Fostoria, Ohio — **Trade Mark: ULTRA SIX**

Gasoline and kerosene	....	25-30	4	3½	5	6	900	680	Remy	Zenith	Paragon or Gies	Force feed	Dyneto or Autolite	575.00

LOANE ENGINEERING COMPANY, Baltimore, Md. — **Trade Mark: FISHERMAN**

Gasoline or kerosene	....	6	4	5	6	1	550	600	Jump spark	Schebler	Own	Gravity	.....	.....
	....	12	4	5	6	2	550	900	Jump spark	Schebler	Own	Gravity	.....	.....
	....	3½	4	3¾	4	1	550	350	Jump spark	Schebler	None	Gravity	.....	.....
	....	18	4	5	6	3	550	1,100	Jump spark	Schebler	Own	Gravity	.....	.....
	....	24	4	5	6	4	550	1,350	Jump spark	Schebler	Own	Gravity	.....	.....

LOCKWOOD ASH MOTOR COMPANY, Jackson, Michigan — **Trade Mark: L-A**

Gasoline	Outboard	2	2	2⅝	2	1	700	70	Jump spark, magneto	Mixing valve	.....	Gasoline mixture	.....	.....
	24	2½	2	3¼	3½	1	750	....	Jump spark	Schebler	.....		.....	.....
	24	4	2	4	4	1	750	....	Jump spark	Schebler	.....		.....	.....
	68	6	2	3½	3½	2	800	....	Jump spark	Schebler	.....		.....	.....
	68	8	2	4	4	2	800	....	Jump spark	Schebler	.....		.....	.....
	44	14	4	3¾	4½	4	800	600	Magneto	Schebler	.....	Force feed	.....	.....

M'INTOSH & SEYMOUR CORP., Auburn, N. Y.

Diesel	M6B24	390	4	....	....	6	265	....	.....	.....	.....	.....	.....	.....
	M6B32	640	4	....	....	6	190	....	.....	.....	.....	.....	.....	.....
	M6B44	960	4	....	....	6	135	....	.....	.....	.....	.....	.....	.....
	M6C44	1300	4	....	....	6	138	....	.....	.....	.....	.....	.....	.....
	M6C50	1550	4	....	....	6	115	....	.....	.....	.....	.....	.....	.....
	M6C56	2000	4	....	....	6	105	....	.....	.....	.....	.....	.....	.....

A. J. MACHEK & CO., Milwaukee, Wis. **Trade Mark: AMPHION**

TYPE (State here whether Gasoline, Kerosene, Heavy Oil, Diesel, Hvid, Semi-Diesel or Outboard)	Model	H.P. Rating	Two-cycle or Four-cycle	Bore, In.	Stroke, In.	No. of Cyls.	Normal R.P.M.	Weight Complete, Lb.	Ignition System	Make of Carburetor	Make of Reverse Gear	Lubrication System	Starting System	List Price
Gasoline, outboard	....	3	2	2½	2½	2	900	76	Bosch	Own	One-way clutch	Oil and gasoline	None	$100.00
Gasoline, inboard	....	3	2	2½	2½	2	900	76	Bosch	Own			None	100.00

THE MECCO ENGINE CO., Philadelphia **Trade Mark: MECCO**

Gasoline	A	4	4	4¼	5	1	600	180	Magneto	Schebler	Gies	Cups	.....	180.00
	B	5	4	5	6	1	500	380	Magneto	Schebler	Gies	Cups	.....	255.00
	AA	9	4	4¼	5	2	600	375	Magneto	Schebler	Gies	Cups	.....	350.00
	BB	10	4	5	6	2	500	500	Magneto	Schebler	Gies	Cups	.....	500.00
	4A	16	4	4¼	5	4	600	500	Magneto	Schebler	Gies	Oilers as ordered	.....	650.00
	4B	22	4	5	6	4	500	1,000	Magneto	Schebler	Gies		.....	900.00

THE MIANUS MOTOR WORKS, INC., Stamford, Conn. **Trade Mark: MIANUS**

Gas oil or fuel oil, gasoline, kerosene	A	3	2	4	4	1	550	175	Make and break	Schebler	Joes or Paragon	Gravity	.....	140.00
Gasoline or kerosene	A	5	2	4⅝	5	1	500	280	Make and break	Schebler		Gravity	.....	198.00
Gasoline	M	6	2	4⅝	5	1	700	270	Jump spark	Schebler		Gravity	.....	173.00
Gasoline, kerosene, gas oil or fuel oil	A	7½	2	5⅛	6	1	450	415	Make and break	Schebler		Gravity	.....	260.00
Gasoline or kerosene	A	10	2	6½	7	1	375	675	Make and break	Schebler		Gravity	.....	330.00
	A-2	6	2	4	4	2	550	300	Make and break	Schebler		Gravity	.....	286.00
	A-2	10	2	4⅝	5	2	500	500	Make and break	Schebler		Gravity	.....	386.00
Gasoline	M-2	12	2	4⅝	5	2	700	500	Jump spark	Schebler		Gravity	.....	346.00
Gasoline, kerosene, gas oil and fuel oil	A-2	15	2	5⅛	6	2	450	750	Make and break	Schebler		Gravity	.....	4 5.00
Gasoline or kerosene	A-2	20	2	6½	7	2	375	1,170	Make and break	Schebler		Gravity	.....	660.00
	XI	30	2	6½	7	3	375	2,000	Jump spark,	Schebler		Gravity	.....	1175.00
Gasoline	F-2	16	4	6	8	2	400	1,600	Make and break	Schebler		Force feed,	.....	1179.75
	F-3	24	4	6	8	3	400	2,200	or both	Schebler		Detroit	.....	1730.30
	F-4	32	4	6	8	4	400	2,750		Schebler			.....	2202.20
Heavy oil	O-1	7	2	5⅛	6⅜	1	500	1,000	Compression	Injection	Special	McCord	Air	.....
	O-2	14	2	5⅛	6⅜	2	500	1,700	Compression	Injection	Special	McCord	Air	.....
	OO-2	30	2	7⅛	9⅞	2	360	5,100	Compression	Injection	Special	McCord	Air	.....
	OO-3	45	2	7⅛	9⅞	3	360	6,500	Compression	Injection	Special	McCord	Air	.....
	OO-4	60	2	7⅛	9⅞	4	360	8,200	Compression	Injection	Special	McCord	Air	.....

MIDWEST ENGINE COMPANY, Indianapolis, Indiana **Trade Mark: MIDWEST-DIESEL, MIDWEST-HVID**

Diesel	DSL-	60	4	9	13	2	350	13,000	Diesel	None	Paragon or equal	Force feed (our make)	Air	.....
		90	4	9	13	3	350	20,000	Diesel	None			Air	.....
	OCM	120	4	9	13	4	350	25,000	Diesel	None			Air	.....
	Vertical	180	4	9	13	6	350	35,000	Diesel	None			Air	.....
		240	4	9	13	8	350	42,000	Diesel	None			Air	.....
	DSL-	180	4	9	13	6	350	36,000	Diesel	None	Directly		Air	.....
	ORM	375	4	13	19½	6	250	115,000	Diesel	None	reversible		Air	.....
		500	4	16	24	6	185	150,000	Diesel	None			Air	.....
Hvid	VDV-	25	4	9	13	1	350	9,000	Hvid	None	Paragon or		Air	.....
	CM	50	4	9	13	2	350	13,000	Hvid	None	equal		Air	.....
		75	4	9	13	3	350	17,000	Hvid	None			Air	.....
		100	4	9	13	4	350	20,000	Hvid	None			Air	.....

AUGUST MIETZ CORPORATION, New York, N. Y. **Trade Mark: MIETZ**

Kerosene, heavy oil, semi-Diesel	....	15	2	6	6½	2	500	1,995	Hot bulb	None used	Mietz	Force feed,	Compressed air	.....
	....	22	2	6	6½	3	500	2,520	Hot bulb	None used	Mietz	McCord	Compressed air	.....
	....	40	2	9	10	2	400	6,300	Hot bulb	None used	Mietz		Compressed air	.....
	....	50	2	10	12	2	340	11,000	Hot bulb	None used	Mietz		Compressed air	.....
	....	60	2	9	10	3	400	7,500	Hot bulb	None used	Mietz		Compressed air	.....
	....	75	2	10	12	3	340	14,000	Hot bulb	None used	Direct reversible		Compressed air	.....
	....	100	2	10	12	4	340	18,000	Hot bulb	None used			Compressed air	.....
	....	150	2	14	18½	3	240	35,000	Hot bulb	None used			Compressed air	.....
	....	200	2	14	18½	4	240	42,000	Hot bulb	None used			Compressed air	.....
	....	350	2	16	21	4	200	65,000	Hot bulb	None used			Compressed air	.....

MILLER ENGINE CO., Chicago, Ill. **Trade Mark: MILLER**

Gasoline and kerosene	F-1	4	4	4½	5	1	600	400	Bosch magneto	Schebler	Own	Pump oiling	Hand starting	.....
	I-1	6	4	5¼	6	1	500	500	and spark coil	Schebler	Own	system	Hand starting	.....
	F-2	10	4	4½	6	2	600	600		Schebler	Own		Hand starting	.....
	I-2	14	4	5¼	6½	2	500	800		Schebler	Own		Hand starting	.....
	E-4	12-20	4	3½	5	4	6-900	650	Bosch magneto	Schebler	Paragon		Bosch starter	.....
	F-4	18-22	4	4½	6	4	5-800	1,200		Schebler	Paragon		Bosch starter	.....
	I-4	24-30	4	5¼	6	4	5-700	1,500		Schebler	Paragon		Bosch starter	.....
	R-4	28-35	4	5¼	7½	4	4-550	1,900		Schebler	Paragon		Bosch starter	.....
	S-4	40-50	4	6	9	4	350-450	2,700		Schebler	Paragon		Bosch starter	.....
Gasoline only, outboard	P-1	2½	2	2¾	2½	1	850	70		Our own	Our own	.....	.....	.....

MISSOURI ENGINE COMPANY, St. Louis, Mo. **Trade Mark: MISSOURI**

Gasoline	....	8	4	4⅜	5	2	500	....	Jump	Schebler	Paragon	Force feed,	None	.....
	....	12	4	5	6	2	500	....	Jump	Schebler	Paragon	Detroit	None	.....
	....	18	4	4⅜	5	4	500	....	Jump	Schebler	Paragon		None	.....
	....	24	4	5	6	4	500	....	Jump	Schebler	Paragon		None	.....
Semi-Diesel	....	7	2	5	6	1	500	....	Hot ball	.....	Paragon		None	.....
	....	14	2	5	6	2	500	....	Hot ball	.....	Paragon		None	.....
	....	22	2	5	6	3	500	....	Hot ball	.....	Paragon	.....	None	.....
	....	30	2	5	6	4	500	....	Hot ball	.....	Paragon		None	.....

MURRAY & TREGURTHA CORP., Atlantic, Mass. **Trade Mark: M. & T.**

Gasoline	E-2	15-18	4	6½	8	2	425	1,600	Make and break	Schebler	M-T	Force feed	None	1000.00
	E-3	20-28	4	6½	8	3	425	1,900	Make and break	Schebler	M-T	Force feed	None	1600.00
	E-4	30-40	4	6½	8	4	450	2,500	Make and break	Schebler	M-T	Force feed	None	2200.00
	E-6	45-60	4	6½	8	6	450	3,000	or magneto	Schebler	M-T	Force feed	None	3250.00
	F-4	40-60	4	7½	10	4	375	4,000		Schebler	M-T	Force feed	None	3000.00
	F-6	80-100	4	7½	10	6	450	....		Schebler	M-T	Force feed	Air	4500.00
	J-6	300-400	4	7¼	9	6	1000-1400	3,350	2-2 pt. high-tension magneto	Spec.	Spec.	Force feed	Electric	12500.00

N. & S. ENGINE CO., Seattle, Wash. **Trade Mark: N. & S.**

Distillate	Marine	20	4	7	9	2	350	2,500	Make and break	Schebler	N. & S.	Detroit force	.....	1575.00
	heavy	30	4	8	10	2	300	3,000	Make and break	Schebler	reversing	feed	.....	2075.00
	duty	40	4	8	9	3	325	4,000	Make and break	Schebler	propeller		.....	3000.00

NEW JERSEY MOTOR SALES COMPANY, Keyport, N. J. **Trade Mark: FORDMARINE**

Gasoline	....	10-15	4	3¾	4	4	800-1200	450	Atwater-Kent	.....	Johnson	Splash	Dayton	.....

THE NEW LONDON SHIP & ENGINE COMPANY, Groton, Conn. — Trade Mark: NLSECO

TYPE (State here whether Gasoline, Kerosene, Heavy Oil, Diesel, Hvid, Semi-Diesel or Outboard)	Model	H.P. Rating	Two-cycle or Four-cycle	Bore, In.	Stroke, In.	No. of Cyls.	Normal R.P.M.	Weight Complete, Lb.	Ignition System	Make of Carburetor	Make of Reverse Gear	Lubrication System	Starting System	List Price
Diesel	....	120	4	9	12½	4	350	16,500	.....	.....	.....	Force feed	.....	.....
	....	180	4	9	12½	6	350	21,800	.....	.....	.....	Force feed	.....	.....
	....	240	4	9	12½	8	350	28,200	.....	.....	.....	Force feed	.....	.....
	....	240	4	13	18	4	240	43,000	.....	.....	.....	Force feed	.....	.....
	....	360	4	13	18	6	240	48,700	.....	.....	.....	Force feed	.....	.....
	....	480	4	13	18	8	240	60,000	.....	.....	.....	Force feed	.....	.....

NEW YORK YACHT, LAUNCH & ENGINE CO., Morris Heights, New York City. — Trade Mark: 20TH CENTURY

Gasoline and kerosene	1919	15–20	4	6½	8½	2	400	2,000	Magneto	Kingston	Own	Force	Leece-Neville	$2500.00
	1919	40–50	4	6½	8½	4	400	3,400	Magneto	Kingston	Own	Force	Leece-Neville	3750.00
	1919	65–75	4	6½	8½	6	400	4,500	Magneto	Kingston	Own	Force	Leece-Neville	5000.00

NIAGARA MOTORS CORPORATION, Dunkirk, N. Y. — Trade Mark: NIAGARA

Gasoline	E2	12	4	4¾	5½	2	800	*625 †450	Magneto and battery	Kingston or Schebler	Own	Manzel	None	*550.00 †615.00
	E4	22–45	4	4¾	5½	4	1000	*995 †725			Own	Manzel	None	*1240.00 †1365.00
	D4	40–80	4	6¼	7	4	1000	*1,650 †1,075			Own	Manzel	None	*1650.00 †1815.00
	D6	60–120	4	6¼	7	6	1000	*2,350 †1,550			Own	Manzel	Leece-Neville	*2600.00 †2845.00
*With iron bases. †With aluminum bases.	D8	80–160	4	6¼	7	8	1000	*3,250 †2,100			Own	Pressure	Leece-Neville	*3750.00 †4045.00

A. E. OLMSTEAD & SONS, Pulaski, N. Y. — Trade Mark: ONTARIO

Gasoline	....	2	2	2⅝	3	1	1650	70	Magneto or battery	Krice	Gies	Oil cups	.....	75.00
	....	3	2	3½	3½	1	900	125		Krice	Gies	Oil cups	.....	95.00
	....	6	2	3½	3½	2	900	190		Krice	Gies	Oil cups	.....	200.00
	....	9	2	3½	3½	3	900	270		Krice	Gies	Oil cups	.....	290.00
	....	12	2	3½	3½	4	900	350		Krice	Gies	Oil cups	.....	395.00
	....	7	2	5	5	1	450	300		Krice	Gies	Oil cups	.....	150.00
	....	14	2	5	5	2	600	500		Krice	Gies	Oil cups	.....	260.00
	....	21	2	5	5	3	600	700		Krice	Gies	Oil cups	.....	385.00
	....	28	2	5	5	4	600	900		Krice	Gies	Oil cups	.....	475.00

PALMER BROS. ENGINES, INC., Cos Cob, Conn. — Trade Mark: PALMER

Gasoline	NL1	3½	4	4½	4½	1	4-600	350	Jump spark	Schebler	None	Own	None	.....
	RW1	5½–6½	4	5⅜	6	1	4-600	425	Jump spark	Schebler	Palmer	Palmer force	None	.....
	RA1	4½	4	4½	6	1	4-600	375	Jump spark	Schebler	Palmer	feed	None	.....
	RA2	9–11	4	4½	6	2	4-600	650	Atwater Kent	Schebler	Palmer		None	.....
	RA3	13–15	4	4½	6	3	4-600	900	Atwater Kent	Schebler	Palmer		None	.....
	RA4	18–20	4	4½	6	4	4-600	1,150	Atwater Kent	Schebler	Palmer		None	.....
	NR1	5–6	4	5	6	1	4-600	400	Jump spark	Schebler	Palmer		None	.....
	NR2	10–12	4	5	6	2	4-600	750	Atwater Kent	Schebler	Palmer		None	.....
	NR3	15–18	4	5	6	3	4-600	1,000	Atwater Kent	Schebler	Palmer		None	.....
	NR4	20–24	4	5	6	4	4-600	1,250	Atwater Kent	Schebler	Palmer		None	.....
	F2	16–18	4	6⅜	8	2	350-400	1,600	Atwater Kent	Stromberg	Palmer	Palmer force	None	.....
	F3	24–26	4	6⅜	8	3	350-400	2,000	Atwater Kent	Stromberg	Palmer	feed and De-	None	.....
	F4	32–35	4	6⅜	8	4	350-400	2,400	Atwater Kent	Stromberg	Palmer	troit oiler	None	.....
	F6	50–60	4	6⅜	8	6	350-400	3,800	Atwater Kent	Stromberg	Palmer		None	.....
	NK2	20–25	4	7½	10	2	3-400	3,000	Atwater Kent	Stromberg	Palmer		None	.....
	NK3	30–35	4	7½	10	3	3-400	3,500	Atwater Kent	Stromberg	Palmer		None	.....
	NK4	45–50	4	7½	10	4	3-400	4,200	Atwater Kent	Stromberg	Palmer		None	.....
	NK6	75–80	4	7½	10	6	3-400	5,600	Atwater Kent	Stromberg	Palmer		None	.....
Gasoline or kerosene	C	4	2	4½	4½	1	450	240	Make and break	Schebler	None	.....	None	.....
	D	6	2	5	6	1	450	350	Make and break	Schebler	None	.....	None	.....
	E	7½	2	6	6	1	450	375	Make and break	Schebler	None	.....	None	.....
Gasoline	U1	2	2	3¾	3½	1	500	135	Make and break	Schebler	None	.....	None	.....
	Q1	2½	2	3¾	3½	1	700	125	Jump spark	Schebler	None	.....	None	.....
	Q2	5	2	3¾	3½	2	700	180	Jump spark	Schebler	None	.....	None	.....
	P1	4	2	4½	4½	1	650	210	Jump spark	Schebler	None	.....	None	.....
	P2	8–10	2	4½	4½	2	650	325	Jump spark	Schebler	Palmer	.....	None	.....

PEERLESS MARINE MOTOR CORP., Buffalo, N. Y. — Trade Mark: PEERLESS

Gasoline or kerosene	....	5–6	4	5	6	1	650	450	Coil and timer	Schebler	Peerless	Gravity	Leece-Neville	275.00
	....	10–12	4	5	6	2	650	600	Coil and timer	Schebler	Peerless	Gravity	2-unit as extra	440.00
	....	16–20	4	4	6	4	750	750	Dixie	Schebler	Peerless	Manzel force	equipment	600.00
	....	25–35	4	5	6	4	750	850	Dixie	Schebler	Peerless	feed		685.00
	....	20–24	4	5¾	7	2	600	1,200	Dixie	Schebler	Peerless			600.00
	....	40–50	4	5¾	7	4	600	1,700	Dixie	Schebler	Peerless			1035.00

PIERCE MOTOR COMPANY, Bay City, Mich. — Trade Mark: PIERCE-BUDD

	....	4–6	2	4	4	1	1000–1500	125	Atwater-Kent	Kingston	.....	Th ough gaso-	.....	.....
	....	12–15	2	4	4	2	1200–1600	170	Atwater-Kent	Kingston	.....	line	.....	.....
	....	18–25	2	4	4	3	300–1800	240	Atwater-Kent	Kingston	.....		.....	.....
	....	30–40	2	4	4	4	250–1800	300	Bosch magneto	Kingston	.....		.....	.....
	....	40–60	2	4	4	6	350–2000	395	Bosch magneto	Kingston	.....		.....	.....

RED WING MOTOR CO., Red Wing, Minn. — Trade Mark: RED WING THOROBRED

Gasoline or kerosene	...	10–14	4	2¾	4	4	1000	300	Dixie, Kingston	Schebler	Paragon	Splash	Leece-Neville	.....
	A	14–20	4	3½	4½	4	800	670	or Bosch	Schebler	Paragon	Splash	Leece-Neville	.....
	AA	18–24	4	3¾	4¾	4	800	680		Schebler	Paragon	Splash	Leece-Neville	.....
	F	28–36	4	4⅜	5	4	1000	610		Schebler	Paragon	Splash	Leece-Neville	.....
	B	32–40	4	4⅜	5	4	1000	650		Schebler	Paragon	Splash	Leece-Neville	.....

REGAL GASOLINE ENGINE CO., Coldwater, Mich. — Trade Mark: REGAL

Gasoline	G	2	4	3¾	3½	1	800	125	Jump spark	Schebler	Johnson	Force	Crank	135.00
Gasoline or kerosene	FA	4	4	4	4½	1	800	290	Jump spark	Schebler	Paragon	Oil cups	Crank	188.00
	NA	5	4	4½	5½	1	700	380	Jump spark	Schebler	Paragon	Oil cups	Crank	238.00
	EA	7	4	5¼	6½	1	600	760	Jump spark or	Schebler	Paragon	Force	Crank	335.00
	JA	9	4	6½	7½	1	500	1,230	makeandbreak	Schebler	Paragon	Force	Crank	533.00
	FB	8	4	4	4½	2	800	520	Jump spark	Schebler	Paragon	Force	Crank	388.00
	NB	10	4	4½	5½	2	700	725	Jump spark	Schebler	Paragon	Force	Crank	508.00
	EB	14	4	5¼	6½	2	600	985	Jump spark or	Schebler	Paragon	Force	Crank	635.00
	JB	18	4	6½	7½	2	500	1,625	makeandbreak	Schebler	Paragon	Force	Crank	850.00
	NC	20	4	4½	5½	4	700	985	Jump spark	Schebler	Paragon	Force	Bosch	823.00
	EC	30	4	5¼	6½	4	600	1,550	Jump spark	Schebler	Paragon	Force	Bosch	1095.00
	JC	36	4	6½	7½	4	500	2,700	Jump spark	Schebler	Paragon	Force	Bosch	1609.00
	SC	50	4	7½	9	4	400	4,600	Jump spark,	Schebler	Paragon	Force	Bosch	2523.00
	CB	32	4	4½	5½	4	1000	800	Jump spark	Schebler	Paragon	Force	Bosch	1146.00

ROBERTS MOTORS, Sandusky, Ohio. — Trade Mark: ROBERTS

Gasoline or kerosene	T	4	2	3½	4	1	1000	98	Coil or magneto	Schebler,	Joe's	Oil in gasoline	.....	90.00
	2-T	8	2	3½	4	2	1000	140	Coil or magneto	Model D	Joe's	Oil in gasoline	.....	130.00
	4-T	16	2	3½	4	4	1000	210	Coil or magneto		Joe's	Oil in gasoline	.....	280.00
	H	8	4	3¾	4	2	1000	160	Coil	Holley	Joe's	Splash	.....	130.00

REMINGTON OIL ENGINE CO., Stamford, Conn. — Trade Mark: REMINGTON

TYPE (State here whether Gasoline, Kerosene, Heavy Oil, Diesel, Hvid, Semi-Diesel or Outboard)	Model	H.P. Rating	Two-cycle or Four-cycle	Bore, In.	Stroke, In.	No. of Cyls.	Normal R.P.M.	Weight Complete, Lb.	Ignition System	Make of Carburetor	Make of Reverse Gear	Lubrication System	Starting System	List Price
Kerosene and heavy oil	Marine	4–75	2	6 to 8¾	6–8	1–4	400–500	600–6000	Hot plug	.....	Paragon	Detroit	Air	.....

S.-R. MANUFACTURING COMPANY, Schenectady, N. Y. — Trade Mark: MOHAWK

Gasoline	B20	3½	2	3½	3¾	1	900	145	Bosch or K.W.	Schebler	Any standard	Oil mixed with	None	$92.50
	B21	7	2	4½	4½	1	900	225	Bosch or K.W.	Schebler	Any standard	gasoline	None	137.00
	B22	7	2	3½	3¾	2	900	215	Bosch or K.W.	Schebler	Any standard		None	177.00
	B23	14–16	2	4½	4½	2	900	395	Bosch or K.W.	Schebler	Any standard		None	280.00
	S24	5–6	2	4⅛	3¾	1	1200	155	Bosch or K.W.	Schebler	Any standard		None	113.00
	S25	10–12	2	4⅛	3¾	2	1200	220	Bosch or K.W.	Schebler	Any standard		None	252.00
	S26	15–21	2	4⅛	3¾	3	1200	290	Bosch or K.W.	Schebler	Any standard		None	338.00
	S27	21–30	2	4½	4½	3	1200	495	Bosch or K.W.	Schebler	Any standard		None	438.00
	M28	6	2	4½	4½	1	700	275	Bosch or K.W.	Schebler	Any standard		None	128.00
	M29	12	2	4½	4½	2	700	400	Bosch or K.W.	Schebler	Any standard		None	223.00
	M30	18	2	4½	4½	3	700	510	Bosch or K.W.	Schebler	Any standard		None	342.00
	H31	5	2	4½	4½	1	500	310	Bosch or K.W.	Schebler	Any standard		None	145.00
	H32	10	2	4½	4½	2	500	510	Bosch or K.W.	Schebler	Any standard		None	246.00
Kerosene	K33	6	2	4½	4½	1	700	280	Bosch or K.W.	Schebler	Any standard	Kerosene	None	157.00
	K34	12	2	4½	4½	2	700	410	Bosch or K.W.	Schebler	Any standard	Kerosene	None	266.00
	K35	25	2	4½	4½	4	700	775	Bosch or K.W.	Schebler	Any standard	Kerosene	None	511.00

SCRIPPS MOTOR COMPANY, Detroit, Mich. — Trade Mark: SCRIPPS

	D-2	12–15	4	4½	6	2	600–900	650	Bosch	Stromberg	Paragon	Pressure	Leece-Neville	.....
Gasoline or kerosene	D-4	25–35	4	4¼	6	4	600–900	1,000	Bosch	Stromberg	Paragon	Pressure	Leece-Neville	.....
	D-4	40–50	4	4¼	6	4	1000–1500	825	Bosch	Stromberg	Paragon	Pressure	Leece-Neville	.....
	D-6	35–45	4	4¼	6	6	600–900	1,425	Bosch	Stromberg	Paragon	Pressure	Leece-Neville	.....
	D-6	60–75	4	4¼	6	6	1000–1500	1,100	Bosch	Stromberg	Paragon	Pressure	Leece-Neville	.....
	Scripps Special	15–20	4	3¾	4	4	600–1200	450	Magneto	Kingston	Own	Pressure and splash	Bosch	.....

SEARS, ROEBUCK & CO., Chicago, Ill. — Trade Mark: MOTORGO

Gasoline	....	2½	2	3¼	3¼	1	750	97	Battery	Schebler	.....	Splash	.....	*77.00
														†83.65
	....	4	2	4	4	1	750	135	Battery	Schebler	.....	Splash	.....	*89.45
														†98.65
	....	6	2	3½	3½	2	750	154	Battery	Schebler	.....	Splash	.....	*124.50
														†133.65
*Fresh. †Salt. ‡Battery.	....	8	2	4	4	2	750	222	Battery	Schebler	.....	Splash	.....	*137.85
														†149.85
§Magneto. **With gear.	Outboard	1¼	2	2⅝	2½	1	850	70	Battery	Schebler	.....	Splash	.....	§59.95
								62	Magneto					§74.95
††No gear.	....	14–16	4	3¾	4½	4	850	**830	Dixie	Schebler	Johnson	Force feed and splash	.....	**427.95
								††665	Magneto					††337.95

SKANDIA PACIFIC OIL ENGINE COMPANY, Oakland, Cal. — Trade Mark: SKANDIA

Semi-Diesel	Marine	9	2	*162	*164	1	500	1,325	Hot ball	None	Own	†Detroit	None	.....
	Marine	16	2	210	240	1	400	2,800	Hot ball	None	Own	†Detroit	None	.....
*Bore and stroke in millimeters.	Marine	24	2	236	280	1	375	3,740	Hot ball	None	Own	†Detroit	Air	.....
	Marine	38	2	224	256	2	375	5,450	Hot ball	None	Own	†Madison-Kipp	Air	.....
†Forced feed.	Marine	55	2	260	290	2	375	7,800	Hot ball	None	Own	†Madison-Kipp	Air	.....
	Marine	70	2	280	360	2	325	9,250	Hot ball	None	Own	†Madison-Kipp	Air	.....
	Marine	120	2	360	400	2	300	17,500	Hot ball	None	Own	†Madison-Kipp	Air	.....
	Marine	140	2	280	360	4	325	16,000	Hot ball	None	Air	†Madison-Kipp	Air	.....
	Marine	185	2	420	480	2	250	25,500	Hot ball	None	Own	†McCord	Air	.....
	Marine	240	2	360	400	4	300	32,000	Hot ball	None	Air	†McCord	Air	.....
	Marine	360	2	420	480	4	250	46,000	Hot ball	None	Air	†McCord	Air	.....
	Marine	500	2	420	480	6	225	70,000	Hot ball	None	Air	†McCord	Air	.....

SMALLEY-GENERAL CO., INC., Bay City, Mich. — Trade Mark: SMALLEY

Gasoline	MB	4–6	2	4½	4½	1	....	....	.....	Schebler	.....	.....	.....	.....
	MBB	12–15	2	4½	4½	2	....	....	.....	.....	.....	.....	.....	.....

STANDARD GAS ENGINE COMPANY, Oakland, Cal. — Trade Mark: FRISCO STANDARD

Gasoline-distillate, kerosene	Heavy duty	5	4	5¾	6½	1	400	....	Make and break	.....	Own	Oil cups	.....	545.00
		8	4	4¾	6	2	440	....	or jump	.....	Own	Force feed,	.....	1045.00
		10	4	5½	6	2	400	....		.....	Own	McCord	.....	1205.00
		12	4	6	7	2	380	....		.....	Own		.....	1430.00
		16	4	6¼	7½	2	360	....		.....	Own		.....	1600.00
		20	4	7¼	9	2	320	....		.....	Own		.....	2145.00
		25	4	6¼	7	3	450	....		.....	Own		.....	2400.00
		30	4	6½	8	3	360	....		.....	Own		.....	2720.00
		40	4	8	10	3	320	....		.....	Own		.....	3450.00
		50	4	8¾	10½	3	300	....		.....	Own		.....	4290.00
		65	4	8	10	4	360	....		.....	Own		.....	5120.00
		80	4	9¾	12	3	280	....		.....	Own		Air starter	6000.00
		85	4	8¾	10½	4	350	....		.....	Own		Air starter	6165.00
		110	4	11¾	15	3	250	....		.....	Own		Air starter	9075.00
		120	4	6¾	12	4	320	....		.....	Own		Air starter	9075.00
		175	4	11¾	15	4	275	....		.....	Own		Air starter	12100.00
		275	4	11¾	15	6	300	....		.....	Own		Air starter	21000.00

STANDARD MOTOR CONSTRUCTION COMPANY, Jersey City, N. J. — Trade Mark: Standard

Gasoline	....	10–12	4	5	6½	2	400–450	850	Standard	Standard	Standard	Standard	.....	.....
	....	16–18	4	6	8	2	350–400	1,200	Standard	Standard	Standard	Standard	.....	.....
	....	20–24	4	5	6½	4	400–450	1,600	Standard	Standard	Standard	Standard	.....	.....
	....	24–27	4	6	8	3	350–400	1,800	Standard	Standard	Standard	Standard	.....	.....
	....	32–37	4	6	8	4	350–400	2,800	Standard	Standard	Standard	Standard	.....	.....
	....	50–54	4	6	8	6	350–400	3,200	Standard	Standard	Standard	Standard	.....	.....
	....	50	4	6½	8	4	550	3,350	High tension	Standard	Standard	Standard	.....	.....
	....	65–75	4	8	10	4	350–400	5,300	Standard	Standard	Standard	Standard	.....	.....
	....	70	4	6½	8	6	550	4,150	High tension	Standard	Standard	Standard	.....	.....
	....	90–100	4	8	10	6	350–400	8,000	Standard	Standard	Standard	Standard	.....	.....
	....	125–150	4	8½	11	6	350–400	5,800	Standard	Standard	Standard	Standard	Air starting and reversing	.....
	....	220	4	10	11	6	450	6,300	Standard	Standard	Standard	Standard	.....	.....
	....	300	4	12	14	6	....	9,500	Standard	Standard	Standard	Standard	.....	.....
	....	500	4	12½	13	6	....	16,000	Standard	Standard	Standard	Standard	.....	.....
Auxiliary	2 K.W.	4	....	4½	4½	1	750	900	.....	.....	.....	.....	.....	.....
	4½ K.W.	8	....	4½	5½	2	700	1,300	.....	.....	.....	.....	.....	.....

STANDARD OIL ENGINE CO., INC., Bridgeport, Conn. — Trade Mark: STANDARD OIL ENGINE

	....	100	4	10	14	4	275	17,000	.....	.....	Own	Madison-Kipp	.....	10000.00
	....	150	4	10	14	6	275	21,000	.....	.....	Own	Madison-Kipp	.....	15000.00

THE STANLEY CO., Salem, Mass. **Trade Mark: STANLEY**

TYPE (State here whether Gasoline, Kerosene, Heavy Oil, Diesel, Hvid, Semi-Diesel or Outboard)	Model	H.P. Rating	Two-cycle or Four-cycle	Bore, In.	Stroke, In.	No. of Cyls.	Normal R.P.M.	Weight Complete, Lb.	Ignition System	Make of Carburetor	Make of Reverse Gear	Lubrication System	Starting System	List Price
Gasoline	C	3	2	4	3½	1	500	175	Make and break	Schebler	Paragon	Oil in gas and gravity	None	.....
	C	5	2	4½	5	1	500	251	Make and break	Schebler	Paragon		None	.....
	D	7½	2	5½	6	1	425	350	Make and break	Schebler	Paragon		None	.....
	C	6	2	4	3½	2	500	290	Make and break	Schebler	Paragon		None	.....
	C	7	2	4	3½	2	600	290	Jump spark	Schebler	Paragon		None	.....
	D	10	2	5⅛	4½	2	450	475	Make and break	Schebler	Paragon		None	.....
	D	14	2	5⅛	4½	2	600	475	Jump spark	Schebler	Paragon		None	.....
	D	15	2	5½	6	2	425	641	Make and break	Schebler	Paragon		None	.....

STERLING ENGINE COMPANY, Buffalo, N. Y. **Trade Mark: STERLING**

	D	12-15	4	5½	7	2	400-500	1,150	K-W impulse starter magneto	Schebler	Sterling	.....	None	$875.00
	E	17-25	4	3¾	5½	4	600-1000	600	Berling magneto	Schebler	Sterling	.....	None	1025.00
	E	17-25	4	3¾	5½	4	600-1000	600		Schebler	Sterling	.....	Rear starter	1070.00
	E	17-25	4	3¾	5½	4	600-1000	600		Schebler	Sterling	.....	North East starter generator	1200.00
	R	225-250	4	5½	6¾	8	1500-1700	1,495	2-spark dual Berling magneto	Schebler	Sterling	.....	None	3000.00
	FH	25-55	4	5½	6¾	4	400-800	2,050	Berling magneto, Atwater-Kent distributor	Schebler	Sterling	.....	Leece-Neville 24-volt, 2 units	2500.00
	FH	35-85	4	5½	6¾	6	400-800	2,450		Schebler	Sterling	.....		3150.00
	FH	50-115	4	5½	6¾	8	400-800	2,750		Schebler	Sterling	.....		3950.00
	FM	60-85	4	5½	6¾	4	800-1200	1,700	2-spark dual	Schebler	Sterling	.....		2350.00
	FM	85-125	4	5½	6¾	6	800-1200	2,250	Berling magneto	Schebler	Sterling	.....		2950.00
	FM	120-170	4	5½	6¾	8	800-1200	2,600		Schebler	Sterling	.....		3950.00
	FM	240-300	4	6¾	9	8	800-1000	5000-5,600		Schebler	Sterling	.....		On app.
	FS	90-100	4	5½	6¾	4	1200-1400	1,400		Schebler	Sterling	.....		2500.00
	FS	130-145	4	5½	6¾	6	1200-1400	1,750		Schebler	Sterling	.....		3150.00
	FS	180-200	4	5½	6¾	8	1200-1400	2,400		Schebler	Sterling	.....		3950.00
	GR	150	4	5¾	6¾	4	1500-1600	Under 1,525		Schebler	Sterling	.....		3150.00
	GR	225	4	5¾	6¾	6	1500-1600	Under 2,000		Schebler	Sterling	.....		4000.00
	GR	300	4	5¾	6¾	8	1500-1600	Under 2,800		Schebler	Sterling	.....		5000.00

STORK MOTOR CO., Saginaw, Mich.

Gasoline	....	3	2	3½	3½	1	700	120	Jump	Schebler	.....	Sight feed	.....	125.00
	....	4	2	4	4	1	700	180	Jump	Schebler	.....	Sight feed	.....	150.00
	....	6	2	4½	4½	1	700	225	Jump	Schebler	.....	Sight feed	.....	175.00
	....	8	2	5	5	1	700	370	Jump	Schebler	.....	Sight feed	.....	200.00
	....	6	2	3½	3½	2	700	200	Jump	Schebler	.....	Sight feed	.....	225.00
	....	8	2	4	4	2	700	400	Jump	Schebler	.....	Sight feed	.....	275.00
	....	12	2	4½	4½	2	700	450	Jump	Schebler	.....	Sight feed	.....	325.00
	....	16	2	5	5	2	700	555	Jump	Schebler	.....	Sight feed	.....	400.00
	....	12	2	4	4	3	700	550	Jump	Schebler	.....	Force feed	.....	400.00
	....	18	2	4½	4½	3	700	600	Jump	Schebler	.....	Force feed	.....	475.00
	....	8	4	4½	5½	2	600	700	.....	.....	.....	Force feed	.....	500.00
	....	10	4	5	6	2	500	900	.....	.....	.....	Force feed	.....	600.00
	....	12	4	5½	6½	2	500	900	.....	.....	.....	Force feed	.....	800.00
	....	16	4	6	7	2	400	1,500	.....	.....	.....	Force feed	.....	1000.00
	....	20	4	6⅜	8	2	400	2,000	Atwater Kent unit sparker	.....	.....	Mechanical force feed	.....	1500.00
	....	25	4	7½	9	2	400	2,500		.....	.....		.....	2000.00
	....	16	4	4½	5½	4	700	1,200	Bosch magneto and Atwater Kent unit sparker	.....	.....		.....	1000.00
	....	20	4	5	6	4	500	1,500		.....	.....		.....	1250.00
	....	24	4	5½	6½	4	500	1,500		.....	.....		.....	1700.00
	....	32	4	6	7	4	400	3,000		.....	.....		.....	2000.00
	....	40	4	6¾	8	4	400	3,500		.....	.....		.....	2500.00
	....	50	4	7½	9	4	400	4,500		.....	.....		.....	3000.00
	....	30	4	4½	5½	6	700	1,400		.....	.....		.....	2000.00
	....	50	4	5½	6½	6	700	1,800		.....	.....		.....	2500.00
	....	75	4	7½	9	6	400	6,000		.....	.....		.....	4500.00

H. W. SUMNER COMPANY. Seattle, Wash.

Heavy oil	F	350	2	16½	22	4	200	20 tons	Electric, warm combustion chamber	Own	Own	Madison-Kipp	Electric, own make	125.00 per h.p.
	S	600	2	16½	22	6	200	40 tons		Own	Own	Madison-Kipp		

UNION GAS ENGINE COMPANY, Oakland, Cal. **Trade Mark: UNION**

Distillate, gasoline or kerosene	Marine	5	4	5¾	6½	1	400	640	Make and break	Master or Schebler	Union	Gravity	None	575.00
	Marine	12	4	6	7	2	400	1,290	Make and break		Union	Manzel force feed	None	1500.00
	Marine	20	4	7½	9	2	360	2,400	Make and break		Union		None	2350.00
	Marine	35	4	7½	9	3	360	4,825	Make and break		Union		None	3500.00
	Marine	45	4	8¼	10½	3	330	6,450	Make and break		Union		None	4050.00
	Marine	60	4	9	11	3	320	7,400	Make and break		Union		None	5100.00
	Marine	80	4	10	12	3	310	9,500	Make and break		Union		None	6800.00
	Marine	85	4	9	11	4	330	10,140	Make and break		Union		None	7650.00
	Marine	110	4	12	15	3	280	17,600	Make and break		Union		Air starter	9900.00
	Marine	110	4	10	12	4	330	12,350	Make and break		Union		Air starter	9350.00
	Marine	150	4	12	15	4	290	22,750	Make and break		Union		Air starter	13500.00
	Marine	225	4	14½	18	4	225	36,400	Make and break		Union		Air starter	22500.00
	Marine	250	4	15¼	20	4	200	49,785	Make and break		Union		Air starter	25000.00
	Marine	300	4	16	21	4	210	55,700	Make and break		Union		Air starter	30000.00

UNIVERSAL MOTOR CO., Oshkosh, Wis. **Trade Mark: UNIVERSAL**

Gasoline or kerosene	C	9-12	4	2⅝	4	4	1200	360	Magneto or Atwater Kent	Mayer	Universal	Pump splash	Hand or electric, Allis-Chalmers	.....

VAN BLERCK MOTOR COMPANY, Monroe, Mich. **Trade Mark: VAN BLERCK**

Gasoline	M-4	75-100	4	5¾	6	4	1000-1500	1,798	2-spark Simms & Berling	Schebler	Paragon-Van Bleck	Pressure-circulating	Leece-Neville	2500.00
	M-6	112-150	4	5¾	6	6	1000-1500	2,100	Magneto and Delco high tension	Stromberg			Leece-Neville	3300.00
	M-8	152-200	4	5¾	6	8	1000-1500	2,667	Ignition equipment	Schebler			Leece-Neville	4200.00
	MM-4	37-65	4	5¾	6	4	600-1100	1,798		Schebler			Leece-Neville	2500.00
	MM-6	52-94	4	5¾	6	6	600-1100	2,100		Stromberg			Leece-Neville	3300.00
	MM-8	70-125	4	5¾	6	8	600-1100	2,667		Schebler			Leece-Neville	4200.00

VULCAN ENGINE WORKS, Philadelphia, Pa.

Trade Mark: VULCAN

TYPE (State here whether Gasoline, Kerosene, Heavy Oil, Diesel, Hvid, Semi-Diesel or Outboard)	Model	H.P. Rating	Two-cycle or Four-cycle	Bore, In.	Stroke, In.	No. of Cyls.	Normal R.P.M.	Weight Complete, Lb.	Ignition System	Make of Carburetor	Make of Reverse Gear	Lubrication System	Starting System	List Price
Gasoline	....	4	4	4⅝	6	1	500	300	Jump	Model D, Schebler	Vulcan	Mechanical force feed and sight feed	.....	$203.00
	....	5	4	5¼	7	1	500	400	Jump		Vulcan		.....	266.00
	....	7½	4	6½	7¼	1	450	600	Jump		Vulcan		.....	308.00
	....	11	4	7½	8½	1	400	900	Jump		Vulcan		.....	455.00
	....	8	4	4⅝	6	2	550	650	Jump		Vulcan		.....	476.00
	....	10	4	5¼	7	2	500	900	Jump		Vulcan		.....	560.00
	....	15	4	6½	7¼	2	475	1,300	Jump		Vulcan		.....	742.00
	....	22	4	7½	8½	2	425	2,200	Jump		Vulcan		.....	1050.00
	....	25	4	6½	7¼	3	475	1,700	Jump		Vulcan		.....	1120.00
	....	35	4	7½	8½	3	425	2,800	Jump		Vulcan		.....	1638.00
	....	56	4	8¾	10½	3	400	4,200	Jump		Vulcan		.....	2660.00
	....	16	4	4⅝	6	4	550	900	Jump		Vulcan		.....	798.00
	....	20	4	5¼	7	4	500	1,200	Jump		Vulcan		.....	980.00
	....	30	4	6½	7¼	4	475	2,050	Jump		Vulcan		.....	1316.00
	....	45	4	7½	8½	4	425	3,400	Jump		Vulcan		.....	2100.00
	....	75	4	8¾	10½	4	375	5,500	Jump		Vulcan		.....	3360.00
	....	40	4	5¼	7½	6	550	1,750	Jump		Vulcan		.....	1645.00
	....	70	4	7	8½	6	425	4,500	Jump		Vulcan		.....	3150.00

UNIVERSAL MACHINE CO., Bowling Green, O.

Trade Mark: TOLEDO

Gasoline	....	3	2	3½	3½	1	750	140	Jump spark	Schebler	.....	.....	.....	.....
	....	7	2	3½	3½	2	750	200	Jump spark	Schebler	.....	.....	.....	.....
	....	6	2	4½	4½	1	750	190	Jump spark	Schebler	.....	.....	.....	.....
	....	12	2	4½	4½	2	750	300	Jump spark	Schebler	.....	.....	.....	.....

WINONA MACHINE & BOAT WORKS, Winona, Minn.

Gasoline	....	5	2	4½	4½	1	700	....	Jump spark	Schebler	Bull Dog	Splash	.....	100.00
	....	10	2	4½	4½	2	700	....	Jump spark	Schebler	Bull Dog	Splash	.....	200.00
	....	15	2	4½	4½	3	700	....	Jump spark	Schebler	Bull Dog	Splash	.....	300.00
	....	20	2	4½	4½	4	700	....	Jump spark	Schebler	Bull Dog	Splash	.....	400.00

WINTON ENGINE WORKS, Cleveland, O.

Trade Mark: WINTON

Gasoline	W6	80	4	6½	9	6	450	5,400	Bosch	Schebler	Winton	Winton force feed	Winton air starting	.....
	W5	125	4	8	11	6	400	10,000	Bosch	Schebler	Winton			.....
	W11	200	4	9½	14	6	450	18,000	Bosch	Schebler	Winton			.....
	W28	150	4	6½	9	6	900	4,000	Bosch	Schebler	Paragon			.....
	W29	200	4	6½	9	8	900	5,000	Bosch	Schebler	Paragon			.....
Diesel	W24A	300	4	12⅛	18	6	210	34 tons	.....	.....	Direct reversible			.....
	W35	200	4	11	14	6	250	22 "	.....	.....				.....
	W40	400	4	12⅛	18	8	210	42 "	.....	.....				.....
	52	50	4	7½	11	3	425	5¾ "	.....	.....	Winton			.....
	53	75	4	7½	11	4	425	7½ "	.....	.....	Winton			.....
	54	125	4	7½	11	6	425	12 "			Winton			.....
	58	150	4	11	14	4	260	15 "			Winton			.....

WISCONSIN MACHINERY & MFG. CO., Milwaukee, Wis.

Trade Mark: WISCONSIN

Gasoline (inboard)	A	5	2	4	4	1	700	160	Battery	Mosler	.....	Gravity	.....	.....
	B	7	2	4½	4½	1	700	190	Battery	Mosler	.....	Gravity	.....	.....
	C	10	2	4	4	2	750	240	Battery	Mosler	.....	Gravity	.....	.....
	D	15	2	4½	4½	2	750	300	Battery	Mosler	.....	Gravity	.....	.....
	E	20	2	4	4	3	850	340	Battery and	Schebler	.....	Force feed	.....	.....
	F	27	2	4½	4½	3	900	400	magneto	Schebler	.....	Force feed	.....	.....
Gasoline (outboard)	J	2	2	2⅝	2½	1	700	50	Battery	Own	.....	Mixed with	.....	.....
	K	2	2	2⅝	2½	1	700	53	Magneto	Own	.....	gasoline	.....	.....
	L	2	2	2⅝	2½	1	700	54	Battery	Own	.....		.....	.....
	M	2	2	2⅝	2½	1	700	55	Magneto	Own	.....		.....	.....
	N	3½	2	3¼	3¼	1	700	100	Magneto	Own	.....		.....	.....

WISCONSIN MOTOR MFG. COMPANY, Milwaukee, Wis.

Trade Mark: WISCONSIN (Consistent)

Gasoline	QM	18	4	3¼	5	4	1000	490	Bosch	Schebler	Paragon	Force, own	Allis-Chalmers	.....
	CM	22	4	3¾	5	4	1000	525	Bosch	Schebler	Paragon	Force, own	North-East	.....
	EM	24	4	4	5	4	1000	550	Bosch	Schebler	Paragon	Force, own	North-East	.....
	AM	40	4	4¾	5½	4	1000	785	Bosch	Schebler	Paragon	Force, own	Leece-Neville	.....
	JM	45	4	5.1	5½	4	1000	825	Bosch	Schebler	Paragon	Force, own	Leece-Neville	.....
	DM	55	4	5¼	7	4	900	1,150	Bosch	Schebler	Paragon	Force, own	Leece-Neville	.....
	MM	65	4	5¾	7	4	900	1,200	Bosch	Schebler	Paragon	Force, own	Leece-Neville	.....
	GM	55	4	4¾	5½	6	1000	1,150	Bosch	Schebler	Paragon	Force, own	Leece-Neville	.....
	KM	75	4	5¼	7	6	900	1,500	Bosch	Schebler	Paragon	Force, own	Leece-Neville	.....
	PM	90	4	5¾	7	6	900	1,600	Bosch	Schebler	Paragon	Force, own	Leece-Neville	.....

WOLVERINE MOTOR WORKS, Bridgeport, Conn.

Trade Mark: WOLVERINE

Kerosene (paraffin), gasoline (petrol), producer gas, alcohol, distillate	Special	5	4	5½	6	1	500	600	Simms	Kingston	Wolverine	Gravity	.....	.....
		14	4	6½	7	2	400-425	1,545	Bosch	Kingston	Wolverine	Manzel	Extra	.....
		22	4	6½	7	3	400-425	2,285	Bosch	Kingston	Wolverine	Manzel	Extra	.....
		32	4	7½	9	3	350-375	3,914	Bosch	Kingston	Wolverine	Manzel	Extra	.....
		42	4	8½	9	3	350-375	4,130	Bosch	Kingston	Wolverine	Manzel	Extra	.....
		60	4	9½	12	3	300-325	7,000	Bosch	Kingston	Wolverine	Manzel	Extra	.....
		80	4	11	12	3	300-325	7,516	Bosch	Kingston	Wolverine	Manzel	Extra	.....
		110	4	12½	14	3	300-325	12,400	Bosch	Kingston	Wolverine	Manzel	Extra	.....
NOTE.—Atwater-Kent or Bosch magneto optional on 6-cyl., 160 and 200 hp.		160	4	11	12	6	330	13,600	Bosch	Kingston	Wolverine	Manzel	Electric	.....
		200	4	11	15	6	330	17,110	Bosch	Kingston	Wolverine	Manzel	Leece-Neville 2-unit	.....
	Semi-Heavy Duty	35-40	4	5½	7	4	700-800	1,800	Bosch	Kingston	Wolverine	Manzel	Extra	.....

THE WRIGHT MACHINE CO., Owensboro, Ky.

Trade Mark: WRIGHT RELIABLE

Gasoline and kerosene	S	20	4	6	7½	2	450	1,500	Bosch high tension with impulse starter	Schebler	Paragon	Detroit	Bosch impulse starter	1400.00
	S	30	4	6	7½	3	450	2,200		Schebler	Paragon	Detroit		1650.00 1600.00 1950.00
NOTES.—First price in List Price column is for Gasoline. Second for Kerosene. Six-cylinder and Left-hand Engines are Special Orders and are not carried in stock.	S	40	4	6	7½	4	450	2,700		Schebler	Paragon	Detroit		2060.00 2400.00
	S	60	4	6	7½	6	450	4,700		Schebler	Paragon	Detroit		4000.00 3600.00
	P	45	4	7½	9	3	350	3,500		Schebler	Paragon	Detroit		3050.00 2750.00
	P	60	4	7½	9	4	350	4,500		Schebler	Paragon	Detroit		3650.00 3320.00
	P	90	4	7½	9	6	350	6,500		Schebler	Paragon	Detroit		6200.00 5800.00

Motor Boat Exports, Fiscal Years 1912 to 1919

	1912		1913		1914		1915		1916		1917		1918		1919	
	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value
EUROPE:																
Austria-Hungary	11	$6,176	11	$4,420	5	$5,022	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Azores and Madeira Islands	1	260	1	3,000	1	1,162	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Belgium	2	615	1	220	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bulgaria	1	228	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Denmark	1	328	6	7,204	.....	.....	.....	.....	.....	.....	2	$1,554	.....	.....	.....	.....
Finland	1	534	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
France	3	528	2	286	.....	.....	.....	.....	.....	.....	2	932	2	$2,400	.....	.....
Germany	20	7,031	23	6,647	17	3,429	1	$110	.....	.....	.....	.....	.....	.....	.....	.....
Gibraltar	1	195	.....	.....	1	316	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Greece	3	1,618	1	1,300	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Italy	10	4,439	4	5,046	2	1,280	.....	.....	.....	.....	7	246,000	72	2,080,800	50	$2,000,000
Malta, etc.	.....	.....	1	175	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Netherlands	5	3,961	4	1,701	.....	.....	1	284	3	$2,685	1	925	.....	.....	.....	.....
Norway	4	939	1	225	3	4,400	.....	.....	3	4,815	4	7,950	1	3,000	2	3,349
Portugal	2	731	3	680	.....	.....	1	221	.....	.....	.....	.....	.....	.....	.....	.....
Roumania	1	2,090	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Russia in Europe	14	6,027	3	1,296	11	6,158	.....	.....	18	387,325	16	376,000	10	117,500	.....	.....
Serbia, Montenegro, etc.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Spain	9	2,224	1	725	4	11,748	1	270	1	189	4	5,417	1	999	.....	.....
Sweden	1	170	.....	.....	1	750	1	200	.....	.....	.....	.....	.....	.....	.....	.....
Switzerland	1	238	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Turkey in Europe	3	783	.....	.....	1	2,625	1	1,350	.....	.....	.....	.....	.....	.....	.....	.....
UNITED KINGDOM:																
England	1	300	5	2,025	8	20,804	4	21,166	10	78,807	1	8,160	1	1,200	.....	.....
Scotland	.....	.....	.....	.....	1	283	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ireland	1	275	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
NORTH AMERICA:																
Bermuda	1	1,400	9	10,277	4	2,340	1	600	1	85	2	2,875	.....	.....	1	300
British Honduras	2	1,290	1	149	4	3,350	.....	.....	1	1,000	1	300	.....	.....	.....	.....
Canada	174	63,752	111	70,419	91	39,045	45	23,387	24	10,569	54	42,775	22	27,296	32	36,315
CENTRAL AMERICA:																
Costa Rica	1	1,250	2	2,088	5	9,067	2	757	.....	.....	2	3,118	.....	.....	.....	.....
Guatemala	1	310	1	200	4	2,684	1	1,730	2	4,829	.....	.....	.....	.....	.....	.....
Honduras	6	8,313	6	2,940	3	5,550	4	2,360	.....	.....	.....	.....	.....	.....	3	3,100
Nicaragua	5	2,362	5	6,335	8	5,875	3	1,465	3	2,438	3	4,230	3	3,750	3	9,460
Panama	18	31,095	12	17,884	17	52,553	6	14,184	91	26,243	18	50,855	6	5,538	3	14,655
Salvador	2	280	3	4,120	3	3,497	2	2,003	1	200	1	360	1	4,750	.....	.....
Mexico	49	92,722	43	81,540	56	123,545	23	115,516	11	16,595	29	32,513	36	111,630	17	32,631
Miquelon, etc.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Newfoundland, Labrador, etc.	1	160	1	96	.....	.....	1	300	1	74	.....	.....	.....	.....	.....	.....
West Indies:																
British:																
Barbados	.....	.....	.....	.....	2	113	.....	.....	.....	.....	.....	.....	1	1,500	.....	.....
Jamaica	3	920	2	2,800	4	1,289	1	170	1	475	.....	.....	.....	.....	1	2,400
Trinidad	.....	.....	5	9,911	.....	.....	.....	.....	.....	.....	1	600	.....	.....	.....	.....
Other British	1	200	3	4,665	6	4,028	1	240	7	12,515	2	5,200	.....	.....	.....	.....
Cuba	33	28,113	21	14,135	16	68,539	11	6,724	23	20,556	16	37,048	7	5,301	6	16,985
Danish	.....	.....	1	190	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dominican Republic	9	11,809	3	4,595	9	12,016	2	738	6	2,200	1	700	3	2,210	.....	.....
Dutch	.....	.....	.....	.....	.....	.....	.....	.....	1	3,500	.....	.....	.....	.....	.....	.....
French	3	4,380	.....	.....	2	2,085	2	3,960	2	9,100	3	6,350	1	462	.....	.....
Haiti	3	3,300	1	600	1	500	1	182	2	4,538	4	2,833	.....	.....	3	2,800
SOUTH AMERICA:																
Argentina	10	4,732	7	8,134	12	8,662	1	2,708	.....	.....	.....	.....	2	2,496	.....	.....
Bolivia	1	250	2	1,280	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	2,500
Brazil	69	286,589	103	366,938	14	13,518	7	2,209	9	7,136	6	12,827	4	4,575	.....	.....
Chile	12	10,705	11	16,186	8	8,035	.....	.....	3	5,142	5	8,911	8	18,788	4	9,535
Colombia	10	49,199	10	60,875	9	96,417	9	26,810	6	5,482	3	7,305	3	19,933	4	6,110
Ecuador	6	3,087	4	7,400	6	4,497	6	1,303	2	1,052	3	1,434	1	335	1	697

Guiana:																
British	2	400	1	313	1	40	.....	.....	2	1,512	1	550	1	6,000	.....	.....
Dutch	2	516	.....	.....	1	608	.....	.....	1	6,000	3	8,363	2	3,000	3	3,300
Paraguay	1	1,100	2	1,783	3	1,800	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Peru	9	8,159	8	11,562	5	12,844	4	14,901	3	6,914	3	8,543	6	11,531	2	5,500
Uruguay	3	1,068	2	400	7	3,652	.....	.....	.....	.....	.....	.....	1	585	.....	.....
Venezuela	6	2,173	9	3,321	5	4,155	1	5,123	.....	.....	5	12,870	4	4,060	.....	.....
ASIA:																
Aden	.....	.....	.....	.....	1	750	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
China	2	626	2	595	.....	.....	2	590	1	3,500	2	536	2	1,089	.....	.....
French China	.....	.....	.....	.....	1	350	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
East Indies:																
British:																
British India	6	1,922	10	7,654	6	1,247	5	2,073	.....	.....	12	7,127	3	2,025	.....	.....
Straits Settlement	2	674	6	1,733	5	2,222	.....	.....	.....	.....	.....	.....	.....	.....	1	553
Other British	1	1,325	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dutch	4	1,641	.....	.....	1	639	1	2,500	3	641	1	365	3	804	.....	.....
Hongkong	1	240	.....	.....	.....	.....	.....	.....	.....	.....	1	300	.....	.....	.....	.....
Japan	4	896	3	1,780	4	5,422	.....	.....	1	150	.....	.....	1	287	8	8,864
Russia in Asia	.....	.....	.....	.....	2	775	.....	.....	12	159,833	.....	.....	.....	.....	.....	.....
Siam	2	450	.....	.....	.....	.....	.....	.....	1	145	.....	.....	.....	.....	1	900
Turkey in Asia	6	2,195	2	1,989	1	260	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
OCEANIA:																
British:																
Australia	4	1,065	3	569	5	1,134	.....	.....	2	303	.....	.....	.....	.....	.....	.....
New Zealand	2	424	3	578	1	200	.....	.....	.....	.....	2	332	.....	.....	.....	.....
Other British	.....	.....	1	315	.....	.....	1	1,282	1	260	.....	.....	3	6,407	.....	.....
French	.....	.....	1	245	.....	.....	.....	.....	.....	.....	1	265	1	1,000	1	150
Philippine Islands	5	1,618	4	3,000	1	2,650	4	5,500	2	12,500	.....	.....	.....	.....	1	2,050
AFRICA:																
Belgian Congo	.....	.....	.....	.....	1	414	1	1,700	.....	.....	.....	.....	.....	.....	1	115,000
British Africa:																
West	3	1,622	.....	.....	2	1,294	2	3,600	.....	.....	1	8,500	.....	.....	.....	.....
South	9	3,856	6	862	2	375	.....	.....	3	925	3	431	.....	.....	.....	.....
East	.....	.....	.....	.....	1	802	1	1,500	.....	.....	.....	.....	2	827	.....	.....
Canary Islands	.....	.....	1	722	1	369	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Egypt	1	200	5	1,470	2	1,750	.....	.....	.....	.....	1	457	.....	.....	.....	.....
French Africa	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	1,432	.....	.....	1	4,500
Liberia	.....	.....	.....	.....	1	178	1	1,100	.....	.....	.....	.....	.....	.....	.....	.....
Morocco	1	150	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Portuguese Africa	2	2,098	2	619	2	472	.....	.....	.....	.....	.....	.....	2	6,855	.....	.....
Spanish Africa	.....	.....	1	261	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS	596	$684,329	516	$768,523	400	$519,584	164	$273,516	264	$800,231	230	$917,438	218	$2,460,583	150	$2,281,654
EUROPE	98	$44,690	67	$34,950	55	$57,977	10	$23,601	35	$473,821	37	$646,938	87	$2,205,899	52	$2,003,349
NORTH AMERICA	312	251,659	230	232,944	235	286,076	108	177,016	177	114,915	137	689,757	82	164,087	69	118,646
SOUTH AMERICA	131	366,978	169	478,237	71	154,228	28	53,054	26	33,238	29	61,003	32	71,303	15	27,642
ASIA	28	9,969	23	13,751	21	11,665	8	5,163	18	164,269	16	8,323	9	4,205	10	10,317
OCEANIA	11	3,107	12	4,707	7	3,984	5	6,782	5	13,063	3	597	4	7,407	2	2,200
AFRICA	16	7,926	15	3,934	11	5,654	5	7,900	3	925	8	10,820	4	7,682	2	119,500

Official Motor Boat Speed Records

From Records of the American Power Boat Association

ONE mile Record, made Sept. 1, 1918, on Detroit River by *Whip-po-Will, Jr.*, 26-ft. hydroplane, 400-hp. Van Blerck motors, Commodore A. L. Judson. Sanctioned event by American Power Boat Association.

Time and speed average by British Admiralty System, six runs over course of one statute mile.

Average Speed, Admiralty System (Mean of Means) 63.498 statute miles per hour.

Run No.		Average Time, Seconds (6 Watches)	Speed, Statute Miles an Hour
1	Downstream .	56.67	63.526
2	Upstream ...	58.00	63.158
3	Downstream .	56.40	63.830
4	Upstream ...	57.27	63.860
5	Downstream .	55.37	65.017
6	Upstream ...	59.37	60.637

Fastest Speed (downstream) 65.017.

Previous One-Mile Records, Official A. P. B. A.

1917—*Miss Detroit II* .....61.724 m.p.h.
1916—*Miss Minneapolis* .....61.083 m.p.h.
1915—*Tech, Jr.* .....53.70 m.p.h.
1914—*Baby Speed Demon II* .....51.726 m.p.h.

Marine Engine Exports, Fiscal Years 1912 to 1919

	1912		1913		1914		1915		1916		1917		1918		1919	
	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value
EUROPE																
Austria-Hungary	159	$16,952	89	$11,359	137	$15,967	25	$3,097	.....	.....	.....	.....	.....	.....	.....	.....
Azores and Madeira Islands	4	843	3	796	14	1,284	10	1,291	7	$1,286	2	$1,240	2	$896	7	$681
Belgium	107	12,640	172	26,821	182	21,206	10	1,472	.....	.....	.....	.....	.....	.....	15	1,110
Bulgaria	20	3,513	.....	.....	14	2,270	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Denmark	460	38,402	489	43,113	313	31,273	71	8,710	153	15,686	270	40,837	90	12,768	58	21,584
Finland	314	44,417	361	42,824	411	41,473	10	3,824	20	1,641	32	21,299	.....	.....	62	25,820
France	68	5,577	261	22,363	292	22,332	81	8,664	69	6,620	800	147,384	155	170,560	98	274,201
Germany	475	53,462	714	70,137	618	70,964	16	2,557	.....	.....	.....	.....	.....	.....	.....	.....
Gibraltar	1	439	1	124	2	253	2	215	5	817	7	2,122	.....	.....	1	409
Greece	4	347	17	2,473	12	1,533	19	3,477	12	5,220	5	784	.....	.....	75	70,202
Iceland and Faroe Is.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8	593	10	1,026	15	1,389
Italy	84	16,518	117	18,591	165	23,749	74	9,072	85	83,978	266	89,007	358	464,498	273	620,395
Malta, Gozo, etc	1	205	5	563	2	504	1	52	.....	.....	.....	.....	.....	.....	.....	.....
Netherlands	210	19,162	394	43,586	463	45,556	231	16,387	377	34,288	333	57,457	.....	.....	88	20,356
Norway	469	58,729	403	55,745	490	57,368	180	29,608	395	55,859	1,069	190,914	317	58,128	684	149,679
Portugal	6	1,075	10	1,067	21	1,791	7	1,041	33	4,466	8	817	25	15,032	14	7,884
Roumania	14	2,338	8	1,316	20	3,324	2	284	24	1,822	.....	.....	.....	.....	.....	.....
Russia in Europe	453	66,414	438	53,841	363	48,593	109	19,876	409	92,299	292	108,434	12	13,245	.....	.....
Serbia, Montenegro, etc.	.....	.....	.....	.....	1	54	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Spain	48	4,784	33	4,097	77	8,646	57	7,100	88	7,997	122	27,916	94	43,707	146	168,305
Sweden	677	61,893	1,156	67,829	687	64,526	66	8,964	177	40,573	190	63,275	49	10,715	193	49,920
Switzerland	2	380	21	3,074	22	3,478	25	4,438	1	260	.....	.....	7	708	8	7,420
Turkey in Europe	13	3,448	4	466	18	3,337	5	2,680	.....	.....	.....	.....	.....	.....	.....	.....
United Kingdom:																
England	520	52,124	746	55,191	958	72,952	622	57,639	1,241	223,539	783	93,173	341	174,988	553	106,551
Scotland	80	6,413	145	12,264	134	16,343	49	6,306	24	3,256	27	3,471	.....	.....	.....	.....
Ireland	31	2,107	51	2,975	44	2,801	4	244	22	848	8	943	.....	.....	66	7,942
NORTH AMERICA:																
Bermuda	7	1,107	4	337	20	1,527	15	1,667	21	1,998	27	5,609	8	685	6	2,06
British Honduras	2	708	6	1,114	22	4,833	25	9,581	11	1,980	35	6,052	14	2,272	24	9,236
Canada	1,842	305,842	1,711	385,134	1,747	302,391	1,042	147,730	1,761	1,780,873	2,026	757,735	2,553	809,973	1,463	608,677
Central America:																
Costa Rica	8	3,595	26	6,530	14	4,811	13	3,801	5	978	7	1,979	1	231	4	432
Guatemala	.....	.....	1	158	5	408	9	4,656	8	648	16	3,069	6	449	10	2,765
Honduras	3	468	6	3,706	10	1,339	20	3,095	10	986	8	2,177	2	1,206	4	1,518
Nicaragua	5	1,609	5	736	21	3,963	13	3,300	10	3,007	9	3,718	16	9,237	14	11,665
Panama	31	4,948	23	7,250	27	6,092	46	12,080	22	4,804	24	5,257	18	13,058	8	2,405
Salvador	4	430	2	243	4	816	9	1,248	2	397	6	536	.....	.....	1	85
Mexico	157	52,208	220	64,047	155	38,902	45	13,193	64	30,255	94	35,458	79	40,109	125	114,682
Miquelon, Langley, etc.	20	3,498	61	5,428	142	13,208	9	814	30	2,276	33	2,922	70	7,305	125	15,297
Newfoundland and Labrador	120	20,119	412	38,966	799	103,895	953	65,127	769	81,911	577	61,062	735	80,811	1,388	228,416
West Indies:																
British:																
Barbados	2	450	.....	.....	1	42	1	97	13	1,947	4	1,753	3	637	.....	.....
Jamaica	9	2,075	9	602	5	850	5	600	2	171	9	1,449	5	2,747	.....	.....
Trinidad and Tobago	5	2,459	9	718	12	1,385	8	1,012	11	1,367	11	1,028	20	2,400	11	13,317
Other British	3	263	6	2,189	23	5,506	20	3,720	12	2,058	8	3,320	7	1,227	106	38,692
Cuba	171	33,369	207	36,883	217	30,393	228	29,027	189	26,344	254	45,776	421	75,143	105	37,613
Danish	.....	.....	9	665	4	295	1	128	4	227	2	243	3	395	5	2,500
Dominican Republic	.....	.....	.....	.....	8	1,908	13	2,400	30	4,830	10	1,663	11	4,008	9	3,156
Dutch (Virgin Is. of U. S.)	3	256	3	872	6	434	3	273	1	67	1	75	3	1,511	.....	.....
French	9	1,662	11	1,113	1	124	1	51	5	1,028	6	809	15	1,528	6	1,047
Haiti	2	484	.....	.....	5	740	.....	.....	2	140	14	1,116	11	1,008	2	303
SOUTH AMERICA:																
Argentina	341	90,357	350	73,358	375	70,058	90	11,327	105	14,101	250	30,785	196	30,004	126	96,871
Bolivia	1	117	3	1,811	1	34	.....	.....	5	573	3	257	.....	.....	1	6,668
Brazil	200	43,881	382	88,429	301	62,882	102	17,428	228	25,862	210	26,492	105	19,259	123	61,070
Chili	30	4,614	25	2,599	58	5,942	33	3,821	32	3,912	61	13,288	83	28,091	69	286,511
Colombia	12	5,557	18	6,533	25	3,647	38	4,218	24	4,826	53	4,818	5	759	9	3,387
Ecuador	39	8,706	46	9,240	49	10,636	56	11,185	14	2,178	38	7,430	11	15,026	5	2,764

Guiana:																
British	7	1,278	5	773	9	965	16	1,875	10	1,271	16	2,138	30	7,635	17	3,230
Dutch	1	850	2	1,053	5	698	3	297	3	229	10	1,395	1	572	2	214
French	1	96	.....	.....	1	96	1	94	.....	.....	.....	.....	.....	.....	.....	.....
Paraguay	4	1,042	13	2,083	8	3,042	.....	.....	1	69	.....	.....	.....	.....	.....	.....
Peru	16	3,500	26	7,547	61	14,835	17	5,052	23	8,537	73	38,316	60	45,003	60	109,446
Uruguay	14	2,279	10	752	27	3,749	19	2,205	24	3,808	14	1,574	8	1,128	17	6,292
Venezuela	3	498	29	2,824	52	4,184	53	4,808	28	2,976	46	9,599	21	3,989	29	3,843
ASIA:																
Aden	.....	.....	.....	.....	2	604	.....	.....	2	64	.....	.....	1	148	.....	.....
China	9	7,453	32	11,577	38	19,330	29	8,280	23	7,618	48	16,660	44	36,107	142	113,629
China: (Leased Territory)																
French	.....	.....	.....	.....	1	44	.....	.....	.....	.....	12	1,219	2	180	.....	.....
Japanese	.....	.....	2	187	.....	.....	.....	.....	.....	.....	3	170	.....	.....	.....	.....
East Indies:																
British:																
British India	21	3,100	74	8,146	86	12,532	179	18,208	165	15,679	165	26,166	259	130,745	117	91,421
Straits Settlements	4	8,156	43	7,113	88	9,361	52	3,552	52	6,209	112	14,914	118	22,220	119	29,427
Other British	.....	.....	1	300	3	708	11	715	.....	.....	10	918	.....	.....	6	4,955
Dutch	16	2,701	11	1,658	22	3,051	6	647	12	1,262	56	11,862	106	24,819	159	82,160
French	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	13	2,588
Hongkong	4	6,390	3	568	19	3,115	4	853	15	2,715	2	171	11	25,691	72	54,983
Japan	13	2,686	43	15,316	52	16,466	19	3,548	29	8,386	54	10,962	154	33,243	419	105,976
Persia	.....	.....	.....	.....	1	100	.....	.....	.....	.....	.....	.....	.....	.....	2	2,987
Russia in Asia	2	1,020	4	362	25	3,006	4	274	14	347,582	2	352	.....	.....	7	4,586
Siam	3	725	2	240	11	1,293	25	2,296	42	4,269	32	5,132	45	10,655	111	82,852
Turkey in Asia	5	1,025	4	401	13	1,493	.....	.....	4	748	.....	.....	.....	.....	.....	.....
OCEANIA:																
British:																
Australia	852	127,596	897	134,803	1,001	150,214	603	85,517	733	96,498	706	87,120	313	55,674	649	100,198
New Zealand	200	68,654	258	49,769	124	21,583	144	20,338	99	20,648	94	23,963	30	15,777	43	11,047
Other British	32	10,022	16	10,321	19	7,450	25	6,011	4	1,338	17	11,886	29	5,437	21	9,189
French	4	2,989	20	16,438	22	27,151	2	2,490	4	6,130	8	11,609	24	9,875	15	16,163
German	7	1,992	8	2,675	7	2,928	1	550	.....	.....	1	1,000	11	14,788	5	7,950
Philippine Islands	58	16,500	39	9,302	164	22,915	91	20,137	17	4,319	188	32,522	73	40,075	383	160,524
AFRICA:																
British Africa:																
West	1	92	.....	.....	13	1,241	1	70	4	300	8	869	4	583	15	2,604
South	47	7,581	115	16,815	97	15,394	108	12,134	130	13,897	82	12,334	13	2,079	48	17,089
East	.....	.....	.....	.....	.....	.....	4	696	1	69	17	2,854	.....	.....	4	1,896
Canary Islands	.....	.....	6	2,183	5	309	3	732	5	1,257	2	156	.....	.....	2	7,300
Egypt	5	654	3	1,411	15	990	.....	.....	4	325	8	795	.....	.....	3	227
French Africa	1	61	.....	.....	8	2,578	8	930	4	1,490	2	200	4	435	17	1,892
German Africa	1	1,356	.....	.....	21	1,676	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Italian Africa	.....	.....	.....	.....	2	190	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Liberia	.....	.....	.....	.....	5	499	.....	.....	1	90	.....	.....	1	190	.....	.....
Madagascar	.....	.....	.....	.....	.....	.....	.....	.....	1	239	.....	.....	.....	.....	1	100
Morocco	.....	.....	1	184	1	95	.....	.....	6	796	.....	.....	.....	.....	2	5,200
Portuguese Africa	6	1,621	7	936	56	6,516	5	2,593	11	938	9	1,624	2	706	11	4,282
Spanish Africa	1	162	.....	.....	5	585	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Totals	8,595	$1,347,199	10,940	$1,586,926	11,606	$1,599,364	5,907	$753,476	8,002	$3,139,955	9,815	$2,204,114	7,225	$2,603,104	8,617	$4,130,121
EUROPE	4,220	$472,152	5,638	$540,615	5,460	$561,577	1,676	$196,995	3,142	$580,455	4,222	$849,666	1,460	$966,271	2,356	$1,533,848
NORTH AMERICA	2,413	437,735	2,804	558,604	3,248	523,602	2,479	303,600	2,982	1,948,292	3,181	942,886	4,001	1,005,940	3,417	1,094,752
SOUTH AMERICA	669	171,775	909	197,002	972	180,768	428	62,310	497	68,342	774	136,095	520	151,466	458	580,296
ASIA	78	26,257	219	45,868	361	71,103	329	38,373	357	394,532	496	88,526	740	283,808	1,167	575,564
OCEANIA	1,153	227,753	1,238	223,308	1,337	232,241	866	135,043	857	128,933	1,014	168,109	480	141,626	1,116	305,071
AFRICA	62	11,527	132	21,529	228	30,073	129	17,155	167	19,401	128	18,832	24	3,993	103	40,590

Fastest Time and Average Motor Boat Speed in Competition

Gold Challenge Cup Races of the American Power Boat Association

THE annual Gold Challenge Cup Races of the American Power Boat Association have developed faster boats practically every year since 1904. The first race was held in that year and was won by C. C. Riotte's *Standard*, which ran at the rate of 23.6 statute miles an hour in carrying off the honors. The winner of this first race was a 60 h.p. craft and finished the 32 nautical miles course in 1:33:30.

Since that time the power of the boats has constantly increased, and there has been a corresponding increase in speed. The only interruption in this steady speed and power growth of the winners of this famous race, came in 1917, when *Miss Detroit II* crossed the line a winner, having averaged 56.5 miles per hour. This is the fastest time recorded, the race being won in 1918 by the Detroit Syndicate's *Whip-po-Will, Jr.*, with an average speed of 52.1 miles per hour. *Miss Detroit II* came back in 1919, however, and won the event in 32.45, averaging 55.0 miles per hour. In making the high record time, however, *Miss Detroit II* used a 250 h.p. engine, while her lower 1919 performance was made with a 400 h.p. engine.

Figuring average speeds, *Miss Detroit II*, 1917 and 1919 winner, could twice complete the course while the 1904 winner, *Standard*, was going the distance once.

The only owner to have three winners was E. J. Schroeder, who won in 1906, 1908 and 1909 with the famous Dixie boats, *Dixie* and *Dixie II*. K. F. Burnham owned the *Dixie II* and *Dixie IV* which won in the following years, 1910 and 1911.

Rubber in Relation to the Industry

More than seventy per cent of the total rubber imported by the United States is absorbed in the manufacture of tires and tubes. Of the remainder, a large proportion is required by the electrical equipment of the automotive vehicle and still more is used in making rubber cement, waterproofing motorists' garments, rubber hose and other articles sold in connection with the industry.

THE present rate of production of plantation and wild rubber is around 350,000 tons per year. The United States is using crude rubber at the rate of 250,000 tons annually, leaving the balance to supply the needs of the rest of the world.

More than 70 per cent of the total quantity of rubber imported by this country is used in the manufacture of tires and tubes for automotive vehicles and a respectable proportion of the remainder is needed to furnish the rubber needed in the manufacture of accessories used in the equipment of cars, trucks, motorcycles and tractors.

An idea of the magnitude of the automotive trade's requirements in rubber may be realized when it is stated that our next biggest rubber industry, that of boots and shoes, uses but 8 per cent of the total.

We are no longer dependent on the wild rubber of South America and elsewhere for our supply. To-day we can look to these sources for but a small percentage of our needs. On the other hand the development of plantation rubber continues intensively and there need be no apprehension of any shortage.

Crude rubber is almost unique in that it has not advanced in price in recent years. During the period in which the Government placed a restrictive price on the several grades, the market price was usually below the figure set. There is no prospect of any reduction in the price of tires, despite the low price of rubber. Cotton, an equally important component, is way up in price—in fact, cotton of suitable grade for tire manufacture is practically unpurchasable.

The cotton position has been further complicated by the almost complete extinction of the Sea Island variety by the boll-weevil. Egyptian cotton is equally suitable, but the supply is inadequate. Other long-staple varieties are available in limited quantities, but the actual position to-day is that the cost of cotton, not of rubber, dominates the price of the tire.

The following tables were compiled from material gathered by the War Industries Board.

THE PRICE TREND IN RAW RUBBER

Year	Pounds Imported	Value	Average price per lb. (cents)
1913	196,291,283	$84,901,600	43
1914	143,065,161	70,742,704	49
1915	221,481,921	111,031,144	50
1916	270,090,205	159,745,476	59
1917	405,638,278	233,220,904	57
1918	325,959,308	146,378,313	44
*1919	380,966,068	148,447,404	38

*For first nine months only. Assuming that importations for the last three months are in the same ratio the total number of pounds imported is 507,954,757, valued at $197,896,538.

CRUDE AND RECLAIMED RUBBER CONSUMED IN THE UNITED STATES IN THE PRODUCTION OF RUBBER GOODS IN 1917

(*Long tons of* 2240 *lb.*)

Class	Crude Rubber Consumed	Per cent of total	Reclaimed Rubber Consumed	Per cent of total
Automobile tires and tubes	110,270	70.00	21,006	23.5
Mechanical rubber goods	21,323	14.00	33,633	38.0
Boots and shoes	12,688	8.00	15,778	18.0
Druggists' and stationers' sundries	3,732	2.00	176	.2
Insulated wire and insulating compounds	2,756	1.70	8,470	9.5
Waterproof clothing and cloth	2,176	1.30	5,667	6.3
Rubber cement	1,462	1.00	9	.0
Hard rubber goods	1,166	1.00	2,163	2.0
Miscellaneous	1,798	1.00	2,266	2.5
Total	157,371	100.0	89,186	100.0

Note.—These data were secured by the Rubber Association of America through a questionnaire sent to 503 consumers of rubber, 448 of whom replied.

It is evident that rubber tires and tubes are the most important products of the industry, having taken over 70 per cent of the total crude rubber in 1917.

Production of pneumatic tires in 1917 was 25,835,573.

The total value of the U. S. A. rubber goods output in 1917 was $896,000,000.

THE WORLD'S PRODUCTION OF CRUDE RUBBER

(*Tons of* 2000 *lb.*)

	Plantation	Brazil	Other grades	Total	Percentage of increase or decrease
1900	4	26,750	27,136	53,890	....
1901	5	30,300	24,545	54,850	+ 1.7
1902	8	28,700	23,632	52,340	+ 4.5
1903	21	31,100	24,829	55,950	+ 6.8
1904	43	30,000	32,077	62,120	+11.0
1905	145	35,000	27,000	62,145	+ 0.004
1906	510	36,000	29,700	66,210	+ 6.5
1907	1,000	38,000	30,000	69,000	+ 4.2
1908	1,800	39,000	24,600	65,400	— 5.2
1909	3,600	42,000	24,000	69,600	+ 6.4
1910	8,200	40,800	21,500	70,500	+ 1.2
1911	14,419	37,730	23,000	75,149	+ 6.5
1912	25,518	42,410	28,000	98,928	+31.6
1913	47,618	39,370	21,452	108,440	+ 9.6
1914	71,380	37,000	12,000	120,380	+11.0
1915	107,867	37,220	13,615	158,702	+31.8
1916	152,650	36,500	12,448	201,598	+27.0
1917	204,348	39,370	13,258	256,976	+27.4
1918 (estimated)	240,000	38,000	12,000	290,000	+12.8

These data have been taken from a bulletin of the Division of Planning and Statistics, War Industries Board.

IMPORTS OF CRUDE RUBBER INTO THE U. S. A. FROM 1913 TO 1918

(*Long tons of* 2240 *lb.*)

	1913	1914	1915	1916	1917	1918
Plantation ...	23,967	35,326	61,085	85,287	134,946	133,167
Paras (including Caucho)	18,481	19,466	32,017	22,490	25,225	20,081
Africans	*	*	*	*	3,330	730
Centrals	*	*	*	*	898	762
Guayule	2,756	850	2,654	435	1,863	1,329
Manicoba and Matto Grasso	*	*	*	*	800	146
All other	6,276	5,084	7,068	6,831	....	....
Totals	51,480	60,726	102,824	115,043	167,062	156,215

*Included in "All other" from 1913 to 1916.

The amount of rubber re-exported from the U. S. A. is practically negligible.

Rubber Substitutes

11,000 tons of Pontianak were consumed in the U. S. A. in 1917.

THE CONSUMPTION OF CRUDE RUBBER

(*Long tons of* 2240 *lb.*)

	United States	Great Britain	France	Germany	Italy	Total
1910	42,210	20,455	3,799	13,775	2,201	82,440
1911	38,475	16,736	5,398	15,281	2,691	78,581
1912	52,964	18,724	4,633	15,643	3,872	95,836
1913	52,179	25,276	6,500	15,500	2,000	101,455
1914	61,251	18,549	5,000	11,000	4,000	99,800
1915	96,792	15,072	10,770	6,000	6,580	135,214
1916 116,477		26,700	14,685	3,000	8,552	109,474
1917 177,088		25,983	17,000	2,000	6,946	229,017

The above table includes all the important consuming countries of the world with the exception of Russia, Japan and Australia, the total consumption of which decreased from 25,000 tons in 1916 to 7,000 tons in 1918.

VIRGIN AND RECLAIMED RUBBER REQUIRED FOR THE MANUFACTURE OF RUBBER GOODS FOR DELIVERY TO THE ARMY AND NAVY OF THE U. S. A. DURING THE CALENDAR YEAR 1918

(*Pounds*)

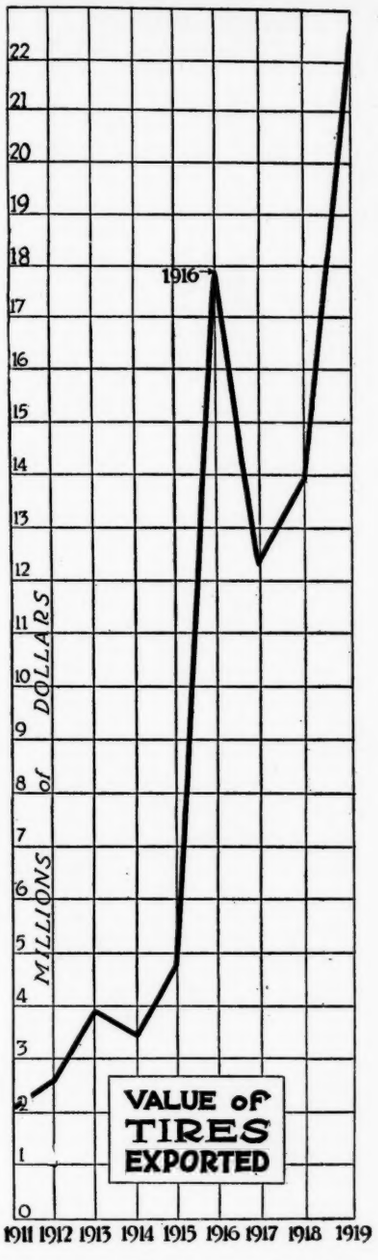
Army requirements:	Virgin	Reclaimed
For tires and tubes—		
Motor vehicles	35,965,167	8,057,454
Airplanes	315,236	26,198
For other articles—		
Chemical warfare gas defense....	2,308,000	102,000
Construction Division	529,587	1,054,609
Engineer Division	297,202	99,408
Medical Division	906,385	47,709
Ordnance Division	57,919	96,531
Quartermaster Division	9,172,579	3,575,683
*Signal Corps	9,122,403	2,706,198
Total Army requirements	58,674,478	15,765,790
Navy	2,846,000	214,000
Total requirements	61,520,478	15,979,790

*Aircraft requirements, other than tires, come under the head of "Signal Corps."

Other Government requirements, that is, the Railroad Administration and the Emergency Fleet Corporation, together with the requirements of Allied nations for war purposes, are estimated to bring the total monthly war requirements up to 3100 tons per month. (Tons of 2000 lb.)

THE Panama Canal Office announces that traffic through Panama Canal in 1919 exceeded that of any previous year, 2396 ships of 7,128,000 net tons, in addition to naval ships displacing 1,000,000 tons, passing through the waterway. Cargoes of merchant ships totalled 7,711,000 tons.

Exports of Pneumatic Tires



This graph, which illustrates the yearly totals of exports of pneumatic tires shown in the table on the following page, reveals an interesting condition of the export trade. The drop in 1917 *and the slight recovery in* 1918 *are due to the restrictions on gasoline in foreign countries and the restrictions on the importation of crude rubber which caused a reduction in production. In the fiscal year of* 1919, *there was a big jump upward, the total running from* $13,977,671 *in* 1917 *to* $22,466,580 *for the last fiscal year. Solid rubber tires are not classified separately in export list*

German Manufacturers Cancel Orders

GERMAN automobile manufacturers, throughout their national association, have decided to cancel all sales contracts for automobiles entered into before the revolution. They say that the radical change in the economic situation of the country, which resulted from the revolution, makes it impossible for them to carry out contracts with customers at the original prices. When these contracts were closed they could not possibly have foreseen the catastrophal events ahead. The cost of raw materials and of partly finished goods, and the wages and salaries, all have increased several hundred per cent. The willingness to work, and the rate of production have dropped to a minimum. Money has lost its value, and strikes and the coal and raw material famine greatly interfere with manufacturing operations, so that the sales prices agreed upon previous to the revolution are far less than the manufacturing cost to-day. The manufacturers state, however, that they are willing to renew the orders at prices corresponding to the present state of the market.

Pneumatic Tire Exports

	1911	1912	1913	1914	1915	1916	1917	1918	1919	Total, All Years
Austria-Hungary	$329	$375	$299	$1,009	.....	.....	.....	.....	.....	$2,012
Azores and Madeira Islands	.....	.....	.....	138	$178	$373	.....	$72	.....	761
Belgium	821	51,620	401,900	15,730	.....	.....	.....	.....	$101,338	571,409
Bulgaria	.....	.....	500	170	150	.....	.....	.....	.....	820
Denmark	98	288	16,611	11,414	12,288	16,089	$6,917	.....	228,090	291,795
Finland	.....	.....	1,545	4,585	.....	.....	.....	.....	.....	6,130
France	185,473	316,629	20,205	5,448	8,723	80,423	425,132	661,648	3,227,830	4,931,511
Germany	29,979	1,160	401,196	132,181	6,090	.....	.....	.....	.....	5,706,606
Gibraltar	.....	.....	.....	.....	.....	.....	.....	129	.....	129
Greece	.....	.....	.....	271	2,680	698	34,654	2,000	39,502	79,805
Iceland and Faroe Islands	.....	.....	.....	.....	.....	.....	61	.....	6,078	6,139
Italy	537	2,387	1,150	915	11,740	333,437	101,362	55,913	585	508,026
Malta, Gozo and Cyprus Islands	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Netherlands	.....	405	424	2,286	1,907	36,548	26,326	215	54,015	122,126
Norway	1,295	79	456	5,649	7,394	10,001	11,937	525	390,640	427,976
Portugal	693	271	282	157	1,434	25,990	9,055	15,488	15,640	69,010
Roumania	.....	174	146	211	.....	576	.....	.....	.....	1,107
Russia in Europe	655	.....	729	1,168	6,480	1,125,733	143,916	94,264	211	1,373,156
Serbia, Montenegro and Albania	.....	.....	.....	.....	.....	.....	.....	.....	300	300
Spain	3,547	.....	567	1,595	2,408	32,984	77,753	12,233	424,040	555,127
Sweden	8,335	7,545	5,301	77,537	26,707	35,850	6,347	.....	505,004	672,626
Turkey in Europe	.....	.....	.....	.....	1,927	.....	.....	.....	47,512	49,439
England	1,104,416	1,177,579	1,125,718	1,503,440	2,655,099	9,175,248	2,569,901			20,461,964
Scotland	.....	.....	.....	336	245	116,858	66,753	618,071	832,492	184,192
Ireland	.....	167	.....	.....	.....	1,376	.....			1,543
North America:										
Bermuda	.....	.....	401	267	139	1,440	14	409	280	2,950
British Honduras	15	612	163	727	64	36	590	3,469	4,824	10,500
Canada	405,778	696,433	1,324,459	961,937	772,574	1,176,836	1,485,939	1,766,518	961,352	9,551,826
Newfoundland and Labrador	955	1,144	693	1,668	4,034	5,108	8,243	11,317	19,015	52,177
Central American States:										
Costa Rica	951	1,863	2,793	6,877	2,381	6,068	11,918	4,018	11,973	48,842
Guatemala	1,343	2,178	2,224	5,547	3,406	6,299	24,545	7,089	48,638	101,219
Honduras	.....	402	299	1,392	3,229	7,932	19,657	19,602	27,090	79,603
Nicaragua	.....	130	429	180	416	157	294	1,042	13,342	15,993
Panama	5,379	4,073	19,466	18,362	24,549	73,854	74,047	137,609	286,370	643,709
Salvador	525	346	1,705	2,084	2,617	11,673	22,530	22,319	88,862	152,661
Mexico	144,893	148,480	203,883	111,948	106,083	236,811	257,413	777,984	1,001,233	2,988,728
West Indies, British:										
Barbados	1,227	1,599	4,588	4,351	4,136	6,019	15,666	19,391	38,911	95,908
Jamaica	11,614	19,285	30,004	55,361	36,887	40,354	109,048	109,097	165,826	577,476
Trinidad and Tobago	689	4,316	16,364	17,023	22,672	30,510	45,654	107,353	83,320	325,921
Other British	477	510	1,869	2,472	3,327	8,337	21,526	25,991	40,895	105,404
Cuba	27,072	21,714	12,322	55,236	192,355	547,410	1,019,915	1,336,233	2,009,263	5,221,520
Danish (Virgin Islands of U. S.)	.....	190	540	1,739	577	1,099	2,753	6,939	8,244	22,081
Dominican Republic	321	2,934	2,306	2,902	3,062	18,223	37,441	61,684	107,255	236,128
Dutch	30	173	767	746	3,068	4,437	7,386	9,084	13,721	39,362
French	.....	134	115	1,045	1,527	1,283	19,399	36,474	135,456	195,433
Haiti	.....	.....	765	2,336	526	998	2,287	13,091	42,031	62,034
South America:										
Argentina	3,541	10,196	8,153	21,920	34,096	488,329	1,301,344	1,649,840	1,837,884	5,355,303
Bolivia	.....	.....	106	1,526	3,413	4,954	9,187	20,513	35,179	74,878
Brazil	10,112	24,952	47,537	11,839	77,425	295,479	606,876	455,102	515,095	2,134,417
Chile	262	354	2,844	10,636	21,353	58,809	264,608	725,876	1,130,873	2,215,610
Colombia	2,564	5,268	16,211	18,925	15,239	28,617	39,298	54,648	87,384	268,154
Ecuador	392	615	8,459	3,313	8,620	9,225	13,645	46,305	75,634	166,208
Falkland Islands	.....	.....	.....	.....	.....	.....	1,817	.....	.....	1,817
Guiana, British	624	1,804	2,726	3,420	3,884	5,512	10,171	29,437	78,369	135,947
Dutch	.....	.....	63	544	308	1,339	2,588	1,918	5,704	12,464
French	.....	.....	.....	.....	.....	14	45	.....	86	145
Paraguay	.....	.....	.....	.....	16	.....	35	.....	2,310	2,361
Peru	557	745	1,273	4,838	5,253	9,663	27,934	107,236	290,398	447,897
Uruguay	586	849	1,990	17,987	11,826	76,608	100,427	224,694	383,081	818,048
Venezuela	130	1,835	10,703	20,439	32,635	71,849	128,966	116,612	183,999	567,168
Asia:										
Aden	.....	30	.....	55	264	1,585	440	2,536	.....	4,910
China	590	850	622	28,326	18,971	41,298	36,952	53,089	196,063	376,711
China (leased territory), British	.....	.....	.....	.....	.....	.....	.....	.....	28,417	28,417
French	.....	.....	.....	.....	.....	999	.....	.....	.....	999
Japanese	.....	181	152	.....	.....	.....	.....	547	1,000	1,880
Chosen (Korea)	.....	.....	240	2,578	2,189	4,330	3,909	927	7,365	21,538
British India	874	676	882	3,555	15,441	119,242	145,820	416,411	447,856	1,150,757
Straits Settlements	283	1,312	1,133	7,174	8,595	63,572	142,271	214,887	617,139	1,056,366
Other British East Indies	160	407	337	30	1,883	19,012	6,692	52,466	30,697	111,684
French East Indies	916	6,170	860	2,677	7,688	201,287	415,742	347,912	812,425	1,795,677
German East Indies	.....	.....	.....	.....	.....	.....	.....	.....	,178	7,178
Hongkong	997	4,568	677	1,057	879	4,189	3,252	6,412	84,231	106,262
Japan	15,319	13,531	29,975	18,629	12,741	20,045	34,243	83,235	354,908	582,626
Russia in Asia	.....	.....	.....	.....	.....	100	12,432	.....	271,069	283,601
Siam	207	.....	1,334	92	742	2,236	8,547	16,179	23,159	52,496
Turkey in Asia	.....	159	.....	.....	4,037	.....	.....	.....	10,409	14,605
Oceania, British:										
Australia	3,292	24,081	58,068	94,321	245,240	1,551,154	783,209	819,755	880,118	4,459,238
New Zealand	7,078	11,847	26,270	35,695	201,379	944,008	689,705	946,804	884,503	3,747,289
Other British	.....	300	37	432	164	574	5,008	16,124	5,664	28,303
Dutch	36	665	956	7,278	5,262	8,990	8,102	10,801	12,820	54,910
French	.....	105	.....	396	.....	41	518	5,211	5,576	11,847
Philippine Islands	90,759	73,763	100,476	141,205	250,832	391,634	345,702	863,727	1,412,929	3,671,027
Africa:										
Belgian Kongo	.....	.....	.....	.....	.....	17	.....	.....	.....	17
British Africa, West	.....	48	89	.....	1,149	27,301	10,967	33,470	80,328	153,352
South	8,310	7,049	17,057	27,090	32,833	291,318	391,211	693,065	620,732	2,088,654
East	.....	55	536	642	4,833	9,732	20,162	21,849	30,655	88,461
Canary Islands	.....	91	270	.....	.....	1,777	.....	.....	220	2,358
Egypt	.....	.....	.....	208	63	532	1,316	.....	16,292	18,411
French Africa	.....	.....	.....	.....	.....	.....	420	2,399	14,390	17,209
Italian Africa	.....	.....	.....	.....	.....	.....	174	.....	.....	174
Liberia	.....	.....	.....	.....	.....	.....	92	.....	.....	92
Madagascar	.....	.....	.....	.....	.....	197	.....	.....	565	762
Portuguese Africa	71	108	.....	.....	946	3,601	.....	.....	2,698	7,424
Totals	$2,085,107	$2,657,809	$3,943,220	$3,505,267	$4,963,270	$17,936,227	$12,330,201	$13,977,671	$22,466,580	$88,698,836

Bearing Mounting Practice

The "sucking fit" for the outer ring is a favorite when the shaft is the revolving member, but a closer fit is recommended if the bearing itself revolves. The tables show prevailing dimensions used by manufacturers

AUTOMOTIVE INDUSTRIES has canvassed manufacturers of ball and roller bearings to get a line on the best practice in mounting, as regards allowances and tolerances. The manufacturers of ball bearings work to limits on the bore of the inner race, the diameter of the outer race, and the width of both races. These limits have been standardized by the Society of Automotive Engineers, but not all of the manufacturers of anti-friction bearings are working to S. A. E. limits. No attempt has ever been made to standardize the limits on shaft diameters and of seats for the outer races, differences of opinion as to the requirements being too great. That different bearing manufacturers should prescribe different allowances and tolerances for the mountings of their bearings is explained, at least in part, by the fact that different limits are used in constructing the bearings.

Bearing Housing Tolerances

The following tolerances are used by the Standard Roller Bearing Company for very light slip fits with annular ball bearings of single or double row types:

Nominal Outside Diameter of Bearing in Inches	Bearing Housing Tolerances in Inches
1.1811 to 1.8504	+.0005 to +.001
2.0472 to 3.9370	+.001 to +.0015
4.3307 to 6.2992	+.001 to +.002
6.6929 to 10.4331	+.0015 to +.0025

Allowances on Housings

(Strom Ball Bearing Mfg. Co.)

The outer ring should have what is commonly called a sucking fit in the housing. This slight freedom will permit of a slow creeping action of the ring and thus, gradually, every portion of the race will be shifted into the position where the greatest pressure is applied.

When the housing itself rotates around a stationary shaft, as, for instance, in the case of a wheel hub, the fit of the bearing in the housing should be slightly tighter, and the allowances must, therefore, be correspondingly reduced as shown in the table.

Outside Diameter of Bearing in Inches			Diameter of Housing if Shaft is Revolving		Diameter of Housing if Shaft is Stationary	
Light or 200 Series	Medium or 300 Series	Heavy or 400 Series	Min.	Max.	Min.	Max.
1.1811	.....	.....	1.1817	1.1822	1.1813	1.1815
1.2598	.....	.....	1.2604	1.2609	1.2600	1.2602
1.3780	1.3780	.....	1.3786	1.3791	1.3782	1.3784
.....	1.4567	.....	1.4573	1.4578	1.4569	1.4571
1.5748	1.5748	.....	1.5754	1.5759	1.5750	1.5752
.....	1.6535	.....	1.6541	1.6546	1.6537	1.6539
1.8504	1.8504	.....	1.8510	1.8515	1.8506	1.8508
2.0473	2.0473	.....	2.0482	2.0487	2.0475	2.0481
2.4410	2.4410	2.4410	2.4419	2.4424	2.4412	2.4418
2.8346	2.8346	2.8346	2.8355	2.8360	2.8348	2.8354
3.1496	3.1496	3.1496	3.1505	3.1510	3.1498	3.1504
3.3465	.....	.....	3.3474	3.3479	3.3467	3.3473
3.5433	3.5433	3.5433	3.5442	3.5447	3.5435	3.5441
3.9370	3.9370	3.9370	3.9380	3.9388	3.9372	3.9380
4.3307	4.3307	4.3307	4.3317	4.3325	4.3309	4.3317
4.7244	4.7244	4.7244	4.7254	4.7262	4.7246	4.7254
4.9213	.....	.....	4.9223	4.9231	4.9215	4.9223
5.1181	5.1181	5.1181	5.1191	5.1199	5.1183	5.1191
5.5118	5.5118	5.5118	5.5128	5.5136	5.5120	5.5128
5.9055	5.9055	5.9055	5.9067	5.9077	5.9059	5.9067
6.2992	6.2992	6.2992	6.3004	6.3014	6.2996	6.3004
6.6929	6.6929	.....	6.6941	6.6951	6.6933	6.6941
7.0866	7.0866	7.0866	7.0878	7.0888	7.0870	7.0878
7.4804	7.4804	7.4804	7.4816	7.4826	7.4808	7.4816
7.8740	7.8740	7.8740	7.8753	7.8763	7.8745	7.8753
.....	.....	8.2677	8.2690	8.2700	8.2682	8.2692
.....	8.4645	.....	8.4658	8.4668	8.4650	8.4660
.....	8.8582	8.8582	8.8602	8.8612	8.8524	8.8604
.....	9.4488	.....	9.4508	9.4520	9.4494	9.4504
.....	.....	9.8425	9.8445	9.8457	9.8431	9.8441
.....	.....	10.4330	10.4350	10.4362	10.4336	10.4348
.....	.....	11.4174	11.4199	11.4211	11.4180	11.4192
.....	.....	12.5985	12.6010	12.6022	12.5991	12.6003

Press Fit Allowances

For Annular Ball Bearings

(Standard Roller Bearing Co.)

Bearing Bore		Shaft Diam., In.	Bearing Bore		Shaft Diam., In.
Mm.	In.		Mm.	In.	
10	0.3937	0.3942±0.0003	55	2.1653	2.1662±0.0003
12	0.4724	0.4729±0.0003	60	2.3622	2.3631±0.0003
15	0.5905	0.5910±0.0003	65	2.5590	2.5599±0.0003
17	0.6693	0.6698±0.0003	70	2.7559	2.7568±0.0003
20	0.7874	0.7879±0.0003	75	2.9527	2.9536±0.0003
22	0.8661	0.8668±0.0003	80	3.1496	2.1507±0.0003
25	0.9843	0.9849±0.0003	85	3.3464	3.3475±0.0003
27	1.0630	1.0637±0.0003	90	3.5433	3.5444±0.0003
30	1.1811	1.1818±0.0003	95	3.7401	3.7412±0.0003
35	1.3779	1.3786±0.0003	100	3.9370	3.9381±0.0003
40	1.5748	1.5755±0.0003	105	4.1338	4.1349±0.0003
45	1.7716	1.7725±0.0003	110	4.3307	4.3318±0.0003
50	1.9685	1.9694±0.0003			

Light Drive Fits for Shafts

For Use with Revolving Shafts and Stationary Housings

(Fafnir Bearing Co.)

Standard Bearing Bore		Shaft Diameter		
Mm.	In.	Standard Size Shaft for Proper Drive Fit	Minimum	Maximum
10	0.3937	0.3941	0.3937	0.3941
12	0.4724	0.4728	0.4724	0.4728
15	0.5906	0.5910	0.5906	0.5910
17	0.6693	0.6698	0.6694	0.6700
20	0.7874	0.7879	0.7875	0.7881
25	0.9843	0.9848	0.9844	0.9850
30	1.1811	1.1817	1.1813	1.1821
35	1.3780	1.3786	1.3782	1.3790
40	1.5748	1.5754	1.5750	1.5758
45	1.7717	1.7723	1.7719	1.7727
50	1.9685	1.9693	1.9689	1.9697
55	2.1654	2.1662	2.1658	2.1666
60	2.3622	2.3630	2.3626	2.3634
65	2.5591	2.5599	2.5595	2.5603
70	2.7559	2.7567	2.7563	2.7571
75	2.9528	2.9536	2.9532	2.9540
80	3.1496	3.1506	3.1502	3.1510
85	3.3465	3.3475	3.3471	3.3479
90	3.5433	3.5443	3.5439	3.5447
95	3.7402	3.7412	3.7408	3.7416
100	3.9370	3.9380	3.9376	3.9384

Annular (Radial) Ball Bearing Tolerances

(The Gurney Ball Bearing Company)

STANDARD BORE TOLERANCES IN INCHES

Bore		Bearing Numbers			Tolerances	
Mm.	Inches	Light Series	Medium Series	Heavy Series	Plus	Minus
10 to 55 inc.	0.39370 to 2.16536 inc.	200 to 211 inc.	300 to 311 inc.	403 to 411 inc.	0.0002	0.0004
60 to 80 inc.	2.36221 to 3.14962 inc.	212 to 216 inc.	312 to 316 inc.	412 to 416 inc.	0.0002	0.0005
85 to 110 inc.	3.34647 to 4.33072 inc.	217 to 222 inc.	317 to 322 inc.	417 to 420 inc.	0.0002	0.0006

STANDARD OUTSIDE DIAMETER TOLERANCES IN INCHES

Outside Diameter		Bearing Numbers			Tolerances	
Mm.	In.	Light Series	Medium Series	Heavy Series	Plus	Minus
30 to 47 inc.	1.18110 to 1.85040 inc.	200 to 204 inc.	300 to 303 inc.	....	0.0000	0.0005
52 to 140 inc.	2.04725 to 5.51183 inc.	205 to 216 inc.	304 to 313 inc.	403 to 411 inc.	0.0000	0.0008
150 to 265 inc. *	5.90554 to 10.43311 inc.	217 to 222 inc.	314 to 322 inc.	412 to 420 inc.	0.0000	0.0012

STANDARD ECCENTRICITY TOLERANCES IN INCHES

Bore		Bearing Numbers			Tolerances	
Mm.	In.	Light Series	Medium Series	Heavy Series	Inner Race	Outer Race
10 to 20 inc.	0.39370 to 0.78740 inc.	200 to 204 inc.	300 to 304 inc.	403 to 404 inc.	0.0006	0.0012
25 to 40 inc.	0.98425 to 1.57481 inc.	205 to 208 inc.	305 to 308 inc.	405 to 408 inc.	0.0008	0.0012
45 to 75 inc.	1.77166 to 2.95277 inc.	209 to 215 inc.	309 to 315 inc.	409 to 415 inc.	0.0010	0.0016
80 to 110 inc.	3.14962 to 4.33072 inc.	216 to 222 inc.	316 to 322 inc.	416 to 420 inc.	0.0012	0.0018

*Width tolerance in inches for individual race rings for all sizes of bearings to be plus 0.000 and minus 0.005 inch

Push Fits for Housings

For Use with Revolving Shafts and Stationary Housings

(Fafnir Bearing Co.)

Standard Bearing Diameter		Housing Diameter		
Mm.	In.	Standard Bore for Proper Push Fit	Minimum	Maximum
28	1.1043	1.1049	1.1045	1.1053
30	1.1811	1.1817	1.1813	1.1821
32	1.2598	1.2604	1.2600	1.2608
35	1.3780	1.3786	1.3782	1.3790
40	1.5748	1.5754	1.5750	1.5758
47	1.8504	1.8510	1.8506	1.8514
52	2.0472	2.0480	2.0476	2.0484
62	2.4409	2.4417	2.4413	2.4421
72	2.8346	2.8354	2.8350	2.8358
80	3.1496	3.1507	3.1502	3.1512
90	3.5433	3.5444	3.5439	3.5449
100	3.9370	3.9381	3.9376	3.9386
110	4.3307	4.3321	4.3315	4.3327
120	4.7244	4.7258	4.7252	4.7264
130	5.1181	5.1198	5.1191	5.1205
140	5.5118	5.5135	5.5128	5.5142
160	6.2992	6.3010	6.3004	6.3016
180	7.0866	7.0887	7.0880	7.0894
215	8.4646	8.4670	8.4662	8.4678
240	9.4489	9.4516	9.4507	9.4525
265	10.4332	10.4362	10.4352	10.4372

Allowances and Tolerances on Housings

(The Gurney Ball Bearing Co.)

Number of Bearings	Housing Stationary		Housing Revolving	
	Allow.	Tolerance	Allow.	Tolerance
202—205 303	+0.0008	+0.0000 −0.0005	+0.0005	+0.0000 −0.0005
206—210 304—308 404—406	+0.0012	+0.0000 −0.0008	+0.0007	+0.0000 −0.0008
211—216 309—313 407—411	+0.0015	+0.0000 −0.0012	+0.0010	+0.0000 −0.0012
217—222 314—322 412—420	+0.0017	+0.0000 −0.0012	+0.0010	+0.0000 −0.0012

These allowances are not for very severe nor high-speed application—no rules can be made for use without discrimination. A general rule to be kept in mind is that the harder the service, the more firmly should the race ring be secured to its seat. Under a jarring or vibrating load it is especially necessary to mount with a tight fit.

Allowances and Tolerances on Shafts

(The Gurney Ball Bearing Co.)

Number of Bearings	Shaft Revolving				Shaft Stationary			
	Race Clamped		Race Loose		Race Clamped		Race Loose	
	Allowances	Tolerances	Allowances	Tolerances	Allowances	Tolerances	Allowances	Tolerances
202—205 303	+0.0000	+0.0004 −0.0000	+0.0002	+0.0004 −0.0000	−0.0004	+0.0004 −0.0000	−0.0002	+0.0004 −0.0000
206—210 304—308 404—406	+0.0000	+0.0006 −0.0000	+0.0003	+0.0006 −0.0000	−0.0006	+0.0006 −0.0000	−0.0004	+0.0006 −0.0000
211—216 309—313 407—411	+0.0002	+0.0006 −0.0000	+0.0005	+0.0006 −0.0000	−0.0008	+0.0006 −0.0000	−0.0006	+0.0006 −0.0000
217—222 314—322 412—420	+0.0005	+0.0008 −0.0000	+0.0008	+0.0008 −0.0000	−0.0010	+0.0008 −0.0000	−0.0008	+0.0008 −0.0000

Shafts should be hardened and ground.

Commercial Terms

C. and F. (Cost and Freight)—Means: Cost of goods plus freight charges to destination specified.

C. I. F. (Cost, Insurance, Freight)—Cost of goods, plus freight and insurance to destination specified.

F. A. S. (Free Alongside Steamer)—Means that the seller is to deliver the goods alongside steamer on lighter, or on receiving pier of the steamship company, in proper shipping condition. All subsequent risks and expenses are for the account of the purchaser.

F. O. B. Cars Mill—Means that the manufacturer is to deliver the goods aboard railroad cars at the mill in proper condition. All subsequent risks and expenses are for the account of the buyer.

C. I. F. and E. (Cost, Insurance, Freight and Exchange)—Cost of goods, plus freight and insurance to destination specified, and the seller takes care of the exchange.

C. I. F. and C. (Cost, Insurance, Freight and Customs)—Cost of goods, plus freight and insurance to destination specified; also the customs at the buyers' port of entry.

C. I. F. C. I. (Cost, Insurance, Freight, Commission and Interest)—A term used mostly in India—Cost of goods, plus freight and insurance to destination specified; also commission which the buyer as an agent is to receive plus the interest charges for allowing credit for a certain definite period.

Method of Computing C. I. F. Quotations

FOR EXAMPLE: C. I. F. Quotations of Case Evaporated Containing 48 Cans, 16 Ounces Each at Havre, France.

1. Cost of Case of Evaporated Milk F. A. S. New York	—$6.55
2. Freight Rate from New York to Havre, France, is $1.25 per 100 pounds. Weight of a Case of Evaporated Milk is about 60 pounds (or 60/100 of $1.25—$0.75)	—$0.75
	$7.30
3. Maximum Insurance Charge for Steel Vessel (1 Per Cent)	—$0.07
	$7.37 per case

C. I. F. Havre, France

Number of Electric Furnaces in Use

DURING the past three or four years there has been a great increase in the number of electric furnaces throughout the world. At the beginning of 1919 there were close to 1000 electric furnaces in operation, divided among the different countries as follows: United States, 287; Great Britain, 147; Italy, 187; Germany, 80; France, 50; Canada, 50. Of these furnaces 35 per cent are of the Herould type. In Great Britain 117 furnaces specially installed for the manufacture and treatment of steel, represent a power of 98,800 kw. The total charging capacity is 384 tons, which is divided between units varying from ½ ton to 50 tons. If account is taken of the fact that these furnaces receive a full charge only 5 days, on the average, per week, 4 weeks per month, the monthly production of steel amounts to 31,170 tons and the annual production to 375,000 tons. Pre-war production was small.

Furnaces of ½-ton capacity consume 250 kilo volt-amperes, and give 7 to 8 runs per day; those of 3 tons capacity consume 850 kilo volt-amperes and give 4 runs. The consumption of those of 15 tons capacity is 30,000 kilo volt-amperes, and the number of runs is 3 per day, with a duration of 7½ hours per run.

In France the development of electric furnaces has passed through a period of stagnation due to the war. The electric steel production during the year 1918 was 60,000 tons. In Germany 40 works possess electric furnaces, and their production in 1918 was 250,000 tons of steel against 90,000 in 1914. One-quarter of all of the electric furnaces in Germany are of the induction type, two-thirds are of the arc type.

Specifications of Stock Engines for

MAKE AND MODEL	Designed for (Cars, Trucks, Tractors)	Number of Cylinders	Bore and Stroke	Piston Displacement (Cu. In.)	Cylinders Cast	Is Cylinder Head Detachable?	Valves Placed	Valve Port Diameter (In.)	Valve Lift (In.)	Type of Cam Follower	Volume of Compression Space (Cu. In.)	Piston Length (In.)	Number of Piston Rings	Is Scraper Ring Used?	Weight of Piston with Wrist Pin and Rings (Lb.)	Weight of Connecting-Rod (Lb.)	Length of Connecting-Rod (C. to C.)	Width of Wrist Pin Bearing (In.)	Diameter of Wrist Pin Bearing (In.)	Width of Connecting-Rod Lower End Bearing (In.)	Diameter of Connecting-Rod Lower End Bearing (In.)	Diameter of Crankshaft	Number of Crankshaft Bearings	LENGTH OF CRANKSHAFT BEARINGS		
																								Front	1st Int.	Rear
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Beaver ML	C,T	4	3½x5	192.4	B	Yes	H	1 7/16	5/16	M	18.79	3 23/32	3	No	2.62	3.25	9¼	13/16	1 1/4	1 3/4	2 1/16	2	3	2 3/4	2	3 3/8
Beaver CK	C	6	3½x5¼	261.3	B	Yes	H	1 9/16	7/16	R	13.06	4 3/8	3	No	2.25	3.43	11	1½	1 5/8	2	2¼	• •	3	2 3/4	2 3/8	3 1/2
Beaver CL	C	6	3½x5¼	303.1	B	Yes	H	1 9/16	7/16	R	15.10	4¼	3	No	2.50	3.43	11	1½	1 5/8	2	2¼	• •	3	2 3/4	2 3/8	3 1/2
Beaver JA	Tr	4	4½x6	381.7	B	Yes	H	2	3/8	R	.....	5 1/16	4	Yes	6.62	8.25	12½	2 5/8	2 3/4	2 1/2	2 3/4	2 3/8	3	3 1/2	3 1/2	4 1/2
Beaver JB	Tr	4	4¾x6	425.3	B	Yes	H	2	3/8	R	.....	5 1/16	4	Yes	7.00	8.25	12½	2 7/8	1 1/2	2 3/4	2¼	2 3/8	3	3 1/2	3 1/2	4 1/2
Bethlehem K	C,T	4	3½x5	194.0	B	Yes	R	1 23/32	1/4	M	.....	4¼	3	No	.....	.....	9 3/4	2	2 5/64	2	1 5/8	1 1/2-1 1/2	3	2 1/2	2 1/2	3
Bethlehem H	T	4	4 x5¼	264.0	B	Yes	R	2	5/16	M	.....	4 3/4	3	No	.....	.....	11½	2 5/8	2 3/64	2 1/4	1 7/8	1 7/8	3	2 1/2	2 3/4	3 13/16
Bethlehem J	T	4	4½x5½	350.0	B	Yes	R	2¼	7/16	M	.....	5 3/4	3	No	.....	.....	12	3½	1 7/64	2½	2 1/8	2 1/2-2 1/2	3	2 7/8	3 1/4	3 5/16
Buda DTU	T	4	3½x5¼	202.0	B	Yes	R	1 5/8	in 9/32Ex 5/16	M	18.00	5	4	Yes	3.00	5.50	11 3/4	1 7/8	1 1/16	2 1/4	2	2	3	2 7/8	2 3/4	3 1/2
Buda CTU	T	4	3¾x5¼	231.9	B	Yes	R	1 5/8	in 9/32Ex 5/16	M	20.40	5	4	Yes	4.00	5.50	11¼	1 7/8	1 1/16	2 1/4	2	2	3	2 7/8	2 3/4	3 1/2
Buda XTU	Tr	4	4½x6	340.4	B	Yes	R	2 1/8	in 9/32Ex 5/16	M	31.10	6¼	4	Yes	5.65	9.21	13¼	2 1/4	1 1/4	3	2 1/4	2 1/4	3	3 1/2	3 1/2	4 1/2
Buda YTU	Tr	4	4½x6	381.7	B	Yes	R	2 1/8	in 9/32Ex 5/16	M	35.50	6¼	4	Yes	6.85	9.21	13¼	2 1/4	1 1/4	3	2 1/4	2 1/4	3	3 1/2	3 1/4	4 1/2
Buda ATU	Tr	4	4¾x6½	460.7	B	Yes	R	2¼	in 5/16Ex 3/8	M	41.70	6¾	4	Yes	7.31	11.59	14¾	2 1/2	1 3/8	3 1/8	2 1/4	2 1/2	3	4 1/8	3 7/8	4 3/8
Buda BTU	Tr	4	5 x6½	510.5	B	Yes	R	2¼	in 5/16Ex 3/8	M	46.10	6¾	4	Yes	7.96	11.59	14 3/8	2 1/2	1 3/8	3 1/8	2 1/2	2 1/2	3	4 1/8	3 7/8	4 3/4
Buffalo BA	T,Tr	4	3½x5	192.4	B	Yes	R	1 3/4	3/8	M	16.00	3 3/4	3	No	2.62	3.00	10 1/4	1 1/16	1 3/32	2 3/16	1 7/8	2 1/4	3	2 7/8	2 1/4	3
Buffalo CA	T,Tr	4	4 x5	251.3	B	Yes	R	1 3/4	3/8	M	19.00	4 1/8	3	No	3.56	3.00	10 1/4	1 1/16	1 3/32	2 3/16	1 7/8	2 1/4	3	2 7/8	2 1/2	3
Buffalo CT	Tr	4	5½x7	665.2	P	No	L	2 1/4	1 1/32	M	69.50	6	3	No	10.25	8.25	13 3/4	3 5/8	1 3/8	3 1/4	2 1/4	2 3/8	3	4 1/2	3 1/2	4 7/16
Chief F	Tr	4	4½x6	381.7	B	Yes	H	2 1/8	3/8	R	28.70	5 5/8	3	No	5.50	5.12	12 1/16	2 1/4	1 1/2	2 3/4	2 1/2	2 1/2	3	3 9/16	3 1/8	4 1/16
Chief B	Tr	4	4¾x6	425.3	B	Yes	H	2 3/8	3/8	R	31.80	5 1/2	3	No	5.62	5.12	12 1/16	2 1/4	1 1/2	2 3/4	2 1/2	2 1/2	3	3 9/16	3 1/8	4 1/16
Climax K	Tr	4	5 x6½	510.5	P	Yes	L	2 1/4	5/16	M	55.30	5 3/4	3	No	7.13	8.50	13	2 3/16	1 3/8	3	2 1/4	3 1/4	3	3 1/2	4	4 1/2
Climax KU	Tr	4	5 x6½	510.5	P	Yes	L	2 1/4	5/16	M	55.30	5 3/4	3	No	7.13	8.50	13	2 3/16	1 3/8	3	2 1/4	2 1/4	3	3 1/2	4	4 1/2
Climax TU	Tr	4	5½x7	665.2	P	Yes	L	2 1/4	5/16	M	71.00	7	3	No	12.68	11.62	14	2 5/8	1 1/2	3 1/2	2 1/2	2 1/2	3	3 1/2	4 1/2	4 1/2
Continental J4	T,Tr	4	3¾x5	220.9	B	Yes	R	1 5/8	5/16	M	16.00	4 7/8	4	No	4.18	5.37	11	1 3/4	1 3/8	2 3/16	2	2 1/4	3	2 3/16	2 1/4	2 5/8
Continental N	C,T	4	3¾x5	220.9	B	No	R	1 47/64	3/8	M	16.70	3 3/4	3	No	2.87	3.43	10 1/4	1 1/2	1 3/32	2 3/16	1 7/8	2 7/32	3	2 7/8	2 1/2	3
Continental 7W	C	6	3½x4½	224.0	B	Yes	R	1 25/64	9/32	M	10.80	3 1/2	3	No	.....	.....	8 1/2	1 1/2	7/8	2	1 7/8	2 7/32	3	2 1/2	2 7/8	2 13/16
Continental 7R	C	6	3½x4½	224.0	B	Yes	R	1 1/2	5/16	M	10.80	4 1/16	3	No	.....	.....	10 1/2	1 3/8	3 3/64	1 37/64	2 1/4	2 7/32	4	2 1/32	1 7/16	1 13/16
Continental C2	T	4	4½x5¼	280.6	B	Yes	R	1 51/64	5/16	M	22.00	5 1/4	3	No	.....	.....	11	1 3/4	1 7/32	2 1/4	2	2 5/16	3	2 7/16	3	3 7/8
Continental C4	T	4	4½x5¼	280.6	B	No	L	1 25/32	1 9/64	M	22.00	5	3	No	.....	.....	10 1/2	1 3/4	1 7/32	3	2 1/4	2 5/16	3	2 9/16	3	3 1/16
Continental K4	T,Tr	4	4½x5¼	280.6	B	Yes	R	1 7/8	5/16	M	20.20	5 7/16	4	No	4.37	6.00	11½	1 7/8	1 1/2	2 3/8	2 1/8	2 1/4	3	2 11/16	2 3/4	2 3/4
Continental 9N	C	6	3½x5¼	303.1	B	No	R	1 17/32	3/16	M	15.70	4 1/2	3	No	.....	.....	10 1/4	1 5/8	1 7/32	2 5/16	2 3/8	2 23/64	3	2 1/2	2 1/8	2 7/8
Continental L4	T,Tr	4	4½x5½	349.9	P	Yes	R	2	5/16	M	25.00	5 15/16	4	No	6.25	8.00	12	2	1 5/8	2 5/8	2 1/4	2 1/4	3	3 1/16	3 1/4	3 1/4
Continental E4	Tr	4	4½x5½	349.9	P	No	L	2	3/16	M	27.00	5 5/8	3	No	.....	.....	11	2 1/4	1 7/16	3	2 1/4	2 5/16	3	2 13/16	3 49/64	4 5/16
Continental B2	T,Tr	4	4¾x6	425.3	P	Yes	R	2 1/8	1 1/32	R	35.90	6 1/8	3	Yes	.....	.....	13¼	2 1/8	1 3/8	3	2 3/8	2 3/8	3	3	4	4
Continental E7	T	4	4½x5½	349.9	P	No	L	2	3/16	M	27.00	5 5/8	3	No	.....	.....	11	2 1/4	1 7/16	3	2 1/4	2 5/16	3	2 13/16	3 23/32	4 5/16
Doman	T,Tr	4	4¾x6	425.3	P	Yes	Op	2 3/4	3/8	M	.....	6 5/8	3	No	7.50	6.50	12½	2 7/8	2 1/4	2 1/4	2 1/4	2 1/4	3	3 7/8	3 7/8	4 1/4
Doman	Tr	4	6 x7	791.6	S	Yes	Op	2 3/4	7/16	M	.....	7 1/4	3	No	12.25	11.25	14	4	1 1/2	3 1/8	2 3/4	2 3/4	5	5	2 7/8	6
Duesenberg 6	C	4	4 x6	301.6	B	No	R-H	2 5/16	3/8	R	24.50	4 13/16	3	No	2.34	4.25	12	1 1/4	1 1/4	2 1/2	2 5/16	2 5/16	2	4	.....	4 5/16
Erd T&TU	T,Tr	4	4 x6	301.6	B	Yes	H	1 3/4	5/16	M	26.40	4 1/2	3	No	3.87	5.62	11 1/2	2	1 7/32	2 3/8	2	2	3	2 29/32	2 3/8	4
Erd T&TU	T,Tr	4	4½x6	340.4	B	Yes	H	1 3/4	5/16	M	29.70	4 1/2	3	No	4.87	5.62	11 1/2	2 3/8	1 7/32	2 3/8	2	2	3	2 29/32	2 3/8	4
Erd A&AU	T,Tr	4	4¾x6	425.3	B	Yes	H	2	3/8	M	33.40	6	3	No	7.18	7.87	12 1/2	2 1/8	1 31/64	3 1/4	2 3/8	2 1/2	3	3 1/2	3 1/2	4 1/2
Falls N	C	6	3 x4¼	180.2	B	Yes	H	1 1/4	9/32	.....	7.90	3 1/4	3	No	1.94	1.75	8 1/8	3/4	3/4	1 5/8	1 7/8	1 7/8	3	2 1/16	2	3
Falls R	C	6	3½x4¼	195.6	B	Yes	H	1 1/4	9/32	.....	8.60	3 1/2	3	No	1.94	1.75	8 1/8	3/4	3/4	1 5/8	1 7/8	1 7/8	3	2 1/32	2	3
Falls R1	C	6	3½x4¼	195.6	B	Yes	H	1 1/4	9/32	.....	8.60	3 1/2	3	No	1.94	1.75	8 1/8	3/4	3/4	1 5/8	1 7/8	1 7/8	3	2 1/32	2	3
G. B. & S. S	C,T,Tr	4	3¾x4¼	187.7	B	Yes	R	1 5/8	7/32	.....	11.70	3 13/16	3	Yes	2.81	1.69	7	1 1/2	7/8	2	1 1/2	1 5/8	3	3	2 1/2	3
G. B. & S. AA	C,T,Tr	4	3¾x5	220.9	B	No	R	1 1 1/16	2 3/64	M	12.70	3 3/4	3	Yes	3.06	2.25	10 1/4	1 1/2	1	2 5/16	1 7/8	2 1/4	3	2 3/4	2	3 3/8
Gray Victory	C,T,Tr	4	3½x5	192.4	B	Yes	H	1 21/32 L 1 3/8	5/16	M	17.80	4 3/32	3	No	2.00	2.18	9 1/4	1 5/8	7/8	2	1 3/4	2	3	2 3/4	2	3 3/8
Hercules C2	T,Tr	4	3¾x5¼	226.4	B	Yes	R	E 1 11/16	1 1/32	M	13.40	4 13/16	4	Yes	3.75	5.00	11	1 3/4	1 1/8	2 1/4	2	2	5	2 1/4	**1 3/4	3 1/2
Hercules CV3	T,Tr	4	4 x5½	257.6	B	Yes	R	1 3/4	1 1/32	M	14.30	4 13/16	4	Yes	3.75	5.00	11	1 7/8	1 1/8	2 3/16	2	2	5	2 3/8	**1 3/4	3 5/8
Hercules M2	T,Tr	4	4¼x5½	312.0	B	Yes	R	1 11/16	1 1/32	M	19.00	5 1/8	5	Yes	5.25	6.50	12	1 11/16	1 1/4	2 1/2	2	2	5	3	**2	4 3/8
Hercules T	T,Tr	4	4¾x6	425.3	P	Yes	R	2 1/8	1 1/32	R	25.80	6 1/4	3	No	6.50	7.50	13 1/4	2 1/8	1 3/8	3	2 3/8	5	5	2 1/2	**2 1/2	4
Herschell-Spillman 7000	C,T,Tr	4	3½x5	192.4	B	Yes	R	1 9/16	5/16	M	.....	3 3/4	3	No	1.75	.....	11	1 11/16	1 7/8	2	2	2	2	4	.....	4
Herschell-Spillman 11000	C	6	3¼x5	248.9	B	Yes	R	1 9/16	5/16	M	.....	3 1/2	3	No	1.62	.....	11	1 11/16	7/8	2	2	2 1/2	3	3	2 5/8	4
Hinkley HAA300	T,Tr	4	3¾x5¼	231.9	B	Yes	R	1 3/4	5/16	R	14.78	4 3/4	3	No	4.87	6.50	11 1/2	1 3/4	1 1/2	2 1/4	2 1/8	2 1/4	3	2 1/4	3	3
Hinkley HAA400	T,Tr	4	4 x5½	263.9	B	Yes	R	1 3/4	5/16	R	16.81	4 1/2	3	No	4.87	6.50	11 1/2	1 3/4	1 1/8	2 1/4	2 1/8	2 1/4	3	2 1/4	3	3
Hinkley HA500	T,Tr	4	4¼x5½	312.0	B	Yes	R	2	5/16	R	19.89	5 1/4	3	No	7.12	8.12	12	1 7/8	1 1/4	2 1/2	2 1/4	2 3/8	3	2 1/2	3 1/16	3 1/2
Hinkley HA200	T,Tr	4	4½x5½	349.9	B	Yes	R	2	5/16	R	22.30	5 1/4	3	No	7.12	8.12	12	1 7/8	1 1/4	2 1/2	2 1/4	2 3/8	3	2 1/2	3 1/2	3 1/2
Hinkley HA1600	T,Tr	4	4½x5½	349.9	B	Yes	H	2	7/16	R	22.30	5 1/4	3	No	7.12	8.12	12	1 7/8	1 1/4	2 1/2	2 1/4	2 3/8	3	2 1/2	3 1/2	3 1/2
Kermath 20	Tr	4	4 x4	201.1	B	No	R	1 3/4	3/8	M	.....	4 1/4	4	Yes	.....	.....	9	2 1/2	7/8	2 1/2	1 3/8	1 3/8	3	3	2 1/2	3
Kessler 4K	C,T	4	3¾x3¾	165.6	B	Yes	H	1 1/2	1 1/32	R.A	16.80	3	3	Yes	2.00	1.08	6 5/8	2 1/2	3/4	2 1/4	1 5/8	2	5	1 1/2	1 1/2	2 1/2
Kessler 6J	C	6	3¾x3¾	247.0	B	Yes	H	1 1/2	1 1/32	R.A	16.80	3	3	Yes	2.00	1.18	6 5/8	2 1/2	3/4	2 1/4	1 5/8	2	7	1 1/2	1 1/2	2 1/2

Explanation of abbreviations: Numbers in brackets indicate the column to which reference is made.

(1) **C** = Car; **T** = Truck; **Tr** = Tractor.

(5) **B** = Block; **P** = Pairs; **S** = Singly; **T** = Threes.

(7) **H** = Head; **R** = Right; **L** = Left; **Op** = Opposite; **Sl** = Sleeve.

(10) **R** = Roller; **M** = Mushroom; **R-A** = Rocker Arm.

(29) **I** = Integral; **S** = Separate; **Opt** = Optional.

(30) **C-P** = Centrifugal Pump; **T-S** = Thermo-Syphon; **G-P** = Gear Pump; **Opt** = Optional.

(31) **S-P** = Splash-Pressure; **C-S** = Circulating-Splash; **Pr** = Pressure; **C-P** = Circulating Pressure.

(32-35) **A** = Aluminum; **I** = Iron; **S-S** = Semi-Steel; **P-S** = Pressed Steel.

Passenger Cars, Trucks and Tractors

Is Cylinder Offset?	If Offset—How Much?	Intake Manifold (Separate or Integral)	Water Circulated By	Lubrication System	Material of Crankcase	Material of Lower Half of Crankcase	Material of Cylinders	Material of Pistons	R.P.M. at Which Maximum H.P. is Developed	R.P.M. at Which Maximum Torque is Developed	Is Governor Fitted?	If so—What Type?	Governed Speed	Maximum Brake H.P. of Average Product	Weight of Engine Without Ignition or Carbureter (Lb.)	Overall Width of Engine (In.)	Overall Height of Engine (In.)	Overall Length of Engine (In.)	Type of Front End Drive	If Chain—What Type?	Adjustable or Non-adjustable	Points of Engine Support	Adapted for Heavy Fuel	Is Bell Housing Provided?	If so—What Number and Type?	MAKE AND MODEL
27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	
Yes	3/8	S	Opt	C-P	I	I	I	I	2100		Opt			37.0	375	24	27 3/4	33 9/16	G			Opt	No	Opt	3-S.A.E	Beaver ML
No		I	C-P	S-P	A	A	I	I			No				525	25 3/4	34 1/16	44 1/2	G			3	No	Yes	3-S.A.E	Beaver CK
No		I	C-P	S-P	A	A	I	I			No				550	25 3/4	34 1/16	44 1/2	G			3	No	Yes	3-S.A.E	Beaver CL
Yes	1/2	I	C-P	S-P	I	I	I	I	1200	700	Yes	Cent	900	40.0	1000	17 3/4	38 11/16	40 1/8	G			Opt	Yes	Opt	2-S.A.E	Beaver JA
Yes	1/2	I	C-P	S-P	I	I	I	I	1200	750	Yes	Cent	900	46.0	1015	17 3/4	38 1/16	40 1/8	G			Opt	Yes	Opt	2 S.A.E	Beaver JB
No		I	T-S	Pr	I	I	I	I	2400	1200	No			40.0	425		29 1/2	50 1/8	G			3	Yes	Yes	4-S.A.E	Bethlehem K
No		I	T-S	Pr	I	I	I	I			Yes		1200				33 1/8	53 9/16	G				Yes	Yes	3-S.A.E	Bethlehem H
No		I	T-S	Pr	I	I	I	I			No		1200				36	56 5/8	G			3	Yes	Yes	2-S.A.E	Bethlehem J
No		I	C-P	Pr*	I	I	I	I	1150		No				775	25 3/4	31 1/2	38 1/4	G			3	No	Yes	3-S.A.E	Buda DTU
No		I	C-P	Pr	I	I	I	I	1150		No				775	25 3/4	31 1/2	38 1/4	G			3	No	Yes	3-S.A.E	Buda CTU
No		I	C-P	Pr	I	I	I	I	1000		No				1050	25 3/4	37 3/8	44 3/4	G			3	No	Yes	3-S.A.E	Buda XTU
No		I	C-P	Pr	I	I	I	I	1000		No				1050	25 3/4	37 3/8	44 3/4	G			3	No	Yes	3-S.A.E	Buda YTU
No		I	C-P	Pr	I	I	I	I	925		No				1425	28 3/4	41 1/4	49 7/8	G			3	No	Yes	1-S.A.E	Buda ATU
No		I	C-P	Fr	I	I	I	I	925		No				1425	28 3/4	41 1/4	49 7/8	G			3	No	Yes	1-S.A.E	Buda BTU
No		I	Opt	C-S	I	P-S	I	I	1800		No			30.0	518	25 3/4	31 7/16	40	G			3	No	Yes	1-Cont.	Buffalo BA
No		I	Opt	C-S	I	P-S	I	I	1600		No			33.0	536	25 3/4	28	40	G			3	No	Yes	1-Cont.	Buffalo CA
Yes	3/8	S	G-P	Pr	Opt	Opt	I	I	1200		No			80.0		34	42	51 1/4	G			3	Yes	No		Buffalo CT
No		I	C-P	Pr	I	I	S-S	S-S	1400	1000	Yes	F.B.	600-1000	40.0	900	21	35	41 3/4				3-4	Yes	Yes	2-3 SAE	Chief F
No		I	C-P	Pr	I	I	S-S	S-S	1400	1000	Yes	F.B.	600-1000	45.0	925	21	35	41 3/4				3-4	Yes	Yes	2-3 SAE	Chief B
No		I	C-P	Pr	I	I	S-S	S-S	900	650	Yes	F-B.	800	36.0	1150	24	39 3/4	47 7/16	G			4	Yes	No		Climax K
No		I	C-P	Pr	I	I	S-S	S-S	900	650	Yes	F-B.	800	36.0	1230	25	39 3/4	49 1/2	G			4	Yes	Yes	2-S.A.E	Climax KU
No		I	C-P	Pr	I	I	S-S	S-S	850	700	Yes	F-B.	750	44.0	1500	26	44	53	G			4	Yes	Yes	1-S.A.E	Climax TU
No		I	C-P	Pr	A	A	I	I	1800	1000	No			34.5	605	26	36 3/8	35	G			3	No	Yes	3-S.A.E	Continental J4
No		I	Opt	S-P	A	P-S	I	I			No				423	25 3/4	32 1/16	39 9/32	G			3	No	Yes	Own	Continental N
No		I	C-P	S-P	I	P-S	I	I			No								G			3	No	Yes	3-S.A.E	Continental 7W
No		I	C-P	Fr	A	P-S	I	I			No								G			3	No	Yes	3-S.A.E	Continental 7R
No		I	C-P	S-P	A	P-S	I	I			No								G			3	No	Yes	Own	Continental C2
No		I	C-P	S-P	A	A	I	I			No								G				No	Yes	2-S.A.E	Continental C4
No		I	C-P	Pr	A	A	I	I	1800	700	No			43.0	680	26	38 1/2	38	G			3	No	Yes	2-S.A.E	Continental K4
No		I	C-P	S-P	A	P-S	I	I			No								G			3	No	Yes	3-S.A.E	Continental 9N
No		I	C-P	Pr	A	A	I	I	1450	900	No			51.0	807	26	39 3/8	41	G			3	No	Yes	2-S.A.E	Continental L4
No				S-P	A	A	I	I											G			3	No	Yes	2-S.A.E	Continental E4
No		I	C-P	Pr	A	A	I	I			Yes	Own	1000						G			3	No	Yes	1-S.A.E	Continental B2
No		I	C-P	S-P	A	A	I	I			No								G			3	No	Yes	2-S.A.E	Continental E7
No		S	C-P	S-P	S-S	I	I	I	900	800	Yes	F-B.		35.0	950	26	33 1/4	45	G			3-4	Yes	Opt	Opt	Doman
No		S	G-P	S-P	S-S	I	I	I	700	700	Yes	F-B.		50.0	1450	32	42	56 1/4	G			3-4	Yes	Opt	Opt	Doman
No		I	C-P	S-P	A	A	S-S	A	2600	1400	No			72.0	565	26	34 1/4	39 3/4	C	S	A	3	No	Yes	3-S.A.E	Duesenberg 6
No		I	C-P	Pr	I	A	S-S	I	1500	700	Yes	FlyB.	1000	30.5	817	23 1/2	35	30 9/16	G			3-4	Yes	Yes	2-3 SAE	Erd T&TU
No		I	C-P	Pr	I	A	S-S	I	1500	700	Yes	FlyB.	1000	34.5	827	23 1/2	35	40 9/16	G			3-4	Yes	Yes	2-3 SAE	Erd T&TU
Yes	1/2	I	C-P	S-P	I	I	S-S	I	1200	700	Yes	FlyB.	1000	43.5	1180	24	42 1/2	46 13/16	G			3-4	Yes	Yes	1-2 SAE	Erd A&AU
No		I	T-S	S-P	I	I	I	I	2100	2000	No			24.5	430	27 9/16	28 15/16	38 9/16	G			3	No	Yes	4-S.A.E	Falls N
No		I	T-S	Pr	I	I	I	I	2100	2000	No			25.0	425	26 1/4	28 15/16	38 9/16	G			3	No	Yes	4-S.A.E	Falls R
No		I	T-S	Pr	I	I	I	I	2100	2000	No			25.0	425	26 1/4	28 15/16	38 9/16	G			3	No	Yes	4-S.A.E	Falls R1
Yes	5/8	S	T-S	C-S	I	P-S	S-S	S-S	1600	800	Yes	Suct	1000	30.0	450	23 1/2	25	34	G			3	No	Yes	3-5 SAE	G. B. & S S
No		S	C-P	Pr	A	A	S-S	S-S	1700	800	Yes	Cent	1400	35.0	410	23 1/8	31	34 1/16	G			3	No	Yes	3-S.A.E	G. B. & S AA
Yes	3/8	I	T-S	S-P	I	I	I	I	1400	1000				34.6	495	28	31	47 1/2	G			3	Yes	Yes	3-S.A.E	Gray Victory
No		I	G-P	Pr	I	I	I	I	1800	1000	Yes	Cent	1400	34.0	650	26 3/4	34 9/16	38 9/16	G			3-4	Opt	Opt	2-3 SAE	Hercules C2
No		S	C-P	Pr	I	I	I	I	1800	950	Yes	Cent	1400	37.0	675	24 1/2	30 1/2	41 3/4	G			3	Opt	Opt	2-S.A.E	Hercules CV3
No		I	C-P	Pr	I	I	I	I	1600	800	Yes	Cent	1250	41.0	875	26 3/4	36 1/2	43 7/8	G			3-4	Opt	Opt	2-3 SAE	Hercules M2
Yes	3/8	S	C-P	Pr	I	I	I	I	1400	800	Yes	F-B.	1000	62.0	1200	25 3/4	41	46	G			3	Opt	Opt	1-2 SAE	Hercules T
No		S	T-S	S-P	I	I	P-S	I	2300	1400	Opt			35.0	440	25 1/2	28 11/16	42 7/8	G			3	No	Yes	3 or 5 S.A.E	Herschell-Spillman 7000
No		S	C-P	S-P	I	P-S	S-S	S-S	2200	1400	No			50.0	563	25 1/2	28 11/16	51 3/8	G			3	No	Yes	3-S.A.E	Herschell-Spillman 11000
No		S	C-P	Fr	S-S	A	S-S	I	1650	750	Yes	Own	1450	37.5	732	25 3/4	36	37 1/4	G			3	No	Yes	3-S.A.E	Hinkley HAA300
Yes	1/8	S	C-P	Pr	S-S	A	S-S	I	1650	750	Yes	Own	1450	43.0	732	25 3/4	36	37 1/4	G			3	No	Yes	3-S.A.E	Hinkley HAA400
No		S	C-P	Pr	S-S	A	S-S	I	1450	700	Yes	Own	1450	44.5	877	25 3/4	40	43 7/8	G			3	No	Yes	2-S.A.E	Hinkley HA500
No		S	C-P	Pr	S-S	A	S-S	I	1450	700	Yes	Own	1450	50.0	877	25 3/4	40	43 7/8	G			3	No	Yes	2-S.A.E	Hinkley HA200
No		S	C-P	Pr	S-S	A	S-S	I	1450	800	Yes	Own	1450	54.0	940	25 3/4	41 5/8	43 7/8	G			3	No	Yes	2-S.A.E	Hinkley HA1650
No		I	C-P	S-P	I	I	I	I	1000		Yes	B		20.0	495				G			4	Yes	No		Kermath 20
No		S	C-P	Pr	I	A	I	I	3000	2000	Opt			70.0	385	24 1/2	26	28	G			3-4	No	Yes	3-S.A.E	Kessler 4K
No		S	C-P	Pr	I	A	I	I	3000	2000	No			90.0	480	24 1/2	26	37 1/2	G			3-4	No	Yes	3-S.A.E	Kessler 6J

(46) **G** = Gear; **C** = Chain.

(47) **S** = Silent.

(48) **A** = Adjustable; **N** = Non-Adjustable.

*Beaver models CK and CL crankshaft diameter: Front, 2¼; center, 2 5/16; rear, 2⅜.

**Other intermediate crankshaft bearings are of similar length to first intermediate.

Specifications of Stock Engines for

MAKE AND MODEL	Designed for (Cars, Trucks, Tractors)	Number of Cylinders	Bore and Stroke	Piston Displacement (Cu. In.)	Cylinders Cast	Is Cylinder Head Detachable?	Valves Placed	Valve Port Diameter (In.)	Valve Lift (In.)	Type of Cam Follower	Volume of Compression Space (Cu. In.)	Piston Length (In.)	Number of Piston Rings	Is Scraper Ring Used?	Weight of Piston with Wrist Pin and Rings (Lb.)	Weight of Connecting-Rod (Lb.)	Length of Connecting-Rod (C. to C.)	Width of Wrist Pin Bearing (In.)	Diameter of Wrist Pin Bearing (In.)	Width of Connecting-Rod Lower End Bearing (In.)	Diameter of Connecting-Rod Lower End Bearing (In.)	Diameter of Crankshaft	Number of Crankshaft Bearings	LENGTH OF CRANKSHAFT BEARINGS		
																								Front	1st Int.	Rear
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
LeRoi.....2A	C,T,Tr	4	2⅞x4	103.8	B...	Yes...	R.....	1 15/16	5/16	M....	8.50	3¼	3	No...	1.43	2.00	8	1 3/16	5/8	2	1½	1½	2	2¾	.....	2¾
LeRoi.....2C	C,T,Tr.	4	3½x4½	138.1	B...	Yes...	R.....	1½	5/16	M....	11.10	3½	3	No...	1.59	2.15	8	1 3/16	¾	2	1¾	1¾	2	2¾	.....	2¾
Lewis.....	C.....	6	3¼x5	248.9	B...	Yes...	R.....	1¾	5/16	M....	.....	3½	3	Yes...	1.18	2.37	9½	2	⅞	1¾	2	2	3	3	2¾	3¼
Light.....H	C.....	4	3¼x4½	149.3	B...	Yes...	L.....	1⅜	9/32	M....	13.50	4	3	No...	2.31	1.75	9	1½	¾	2	1¾	1⅞	2	2¼	.....	2¾
Lycoming.....K	C,T....	4	3½x5	192.4	B...	Yes...	R.....	1½	1 9/32	M....	14.37	4	3	No...	2.31	3.12	9½	1 9/16	⅞	2⅛	2	2⅛	2	3 9/16	.....	3 9/16
Matthews.....F	C,T....	4	3½x5	192.4	B...	Yes...	H....	1⅜	9/32	M....	16.00	3¾	3	No...	2.40	3.53	9¼	1¾	⅞	2	1¾	2	3	2¾	2	3¼
Minerva.....A20	T,Tr...	4	4½x6	381.7	P...	Yes...	R.....	2¼	⅜	M....	31.70	6	3	No...	6.43	8.18	13¼	2¼	1¼	3	2 5/16	2½	3	3	4	4
North American.....C	T,Tr...	4	3¾x4½	198.8	P...	No...	L.....	1½	9/32	M....	14.50	4½	3	No...	4.25	2.87	8½	2¼	1	2¼	1½	1 5/16	3	2¾	2½	3½
North American.....CX	T,Tr...	4	4 x4½	226.2	P...	No...	L.....	1⅝	9/32	M....	16.20	4½	3	No...	4.25	2.87	8½	2¼	1	2¼	1½	1⅝	3	2¾	2½	3½
North American.....D	T Tr...	4	4½x6	360.8	P...	No...	L.....	2⅛	11/32	M....	30.00	6	4	No...	5.81	5.25	11½	2½	1¼	2½	1⅞	2	3	3	3	4
Pittsburg.....84	T.....	4	3 x4½	127.2	B...	Yes...	R.....	1⅛	5/16	M....	11.76	4 3/32	3	No...	2.12	2.68	11	1½	55/64	1 37/64	1 9/16	1 11/16	3	3	2	2 1/16
Pittsburg.....86	C.....	8	3¼x5	331.8	B...	No...	R.&L.	1 3/16	1 1/32	R-A...	10.90	3½	3	No...	2.00	2.90	11	1½	⅞	1½	1⅞	2	3	3	3	3¾
Pittsburg.....85	T.Tr...	4	4½x6	381.7	B...	Yes...	L.H...	1¾	1 1/32	M....	33.50	6	4	Yes...	6.12	6.00	13	2⅛	1¼	2½	2¼	2½	3	3	2½	4
Red Wing.....AA	Tr.....	4	3¾x4¾	209.9	P...	No...	L.....	1 7/16	.281	.....	11.90	4⅛	3	No...	3.50	2.62	8½	1⅛	1 1/16	2⅛	1½	1½	3	3	2¾	3
Red Wing.....F	Tr.....	4	4 7/16x5	259.2	B...	No...	L.....	1¾	3/10	.....	19.90	4¾	4	Yes...	4.75	3.62	10½	1¼	1 1/16	2¼	1¾	1¾	3	3½	2¼	4 9/16
Red Wing.....B	Tr.....	4	4½x5	318.1	B...	No...	L.....	1 15/16	3/10	.....	27.00	4¾	4	Yes...	5.31	4.12	10⅜	1 13/32	1 1/16	2¼	2	2	3	3½	2¼	4 9/16
Reliable.....OO	Tr.....	2	6 x6	340.0	B...	Yes...	H....	2⅛	9/16	R....	45.00	7 1/16	3	No...	18.50	10.00	12½	2	1 3/16	2 3/16	2 3/16	2 5/16	2	4½	.....	5¼
Reliable.....VRT	Tr.....	2	6 x7	400.0	B...	Yes...	H....	2⅛	½	R....	67.00	7	3	No...	18.25	15.25	18	3 3/16	1½	3	3	3	2	5	.....	6
R. & V. Knight.....J	C.....	6	3½x4½	260.0	B...	Yes...	Sl....	.....	.....	.....	11.30	4 7/16	3	No...	2.93	4.25	10 3/4	1 5/8	1¼	2	2 3/16	2 3/16	3	2 1/16	3 1/16	3
R. & V. Knight.....R	C.....	4	3¾x5	220.9	B...	Yes...	Sl....	.....	.....	.....	15.39	4½	3	No...	3.18	4.75	10¾	1 5/8	1¼	2½	2¼	2 1/16	3	2¼	2 1/16	3 3/4
Rutenber.....25	C.....	6	3½x5	230.1	B...	Yes...	R.....	1 9/16	5/16	M....	12.50	3¾	4	Yes...	1.81	1.93	9½	1½	¾	1 7/16	2	2	3	2¾	2¾	3 1/16
Supreme.....S4	C,T....	4	3⅜x5	178.9	B...	Yes...	L.....	1⅝	9/32	M....	.....	4	3	No...	1.50	.....	10	1⅝	⅞	2	2	2	3	2⅝	2 1/16	3 1 1/16
Supreme.....K5	C.....	6	3¼x5	248.9	B...	Yes...	L.....	1⅝	5/16	M....	.....	4	3	No...	.....	.....	10	1⅝	⅞	1 1/16	2	2	3	2½	2⅝	2 1 9/16
Teetor.....19H	C.....	6	3½x5	230.1	B...	Yes...	R.....	1⅜	.343	R....	10.60	3 5/16	3	Yes...	1.93	2.97	9½	1⅝	1	1 1/16	1 7/16	2	3	2⅞	2¾	3¼
Teetor.....19T	C.....	6	4½x6	572.5	B...	No...	Op ...	2	5/16	.....	28.60	5 1/16	5	Yes...	3.00	3.75	12	3	1	2¼	1⅝	2	4	4¼	**	4
Trego.....101	C.....	6	3½x5	288.6	B...	Yes...	H....	1⅜	5/16	M....	.....	4	3	No...	3.37	3.00	10	2	1 1/16	1 7/16	2¼	2¼	3	2⅝	2½	3¼
Trego.....100	C.....	6	3½x5	288.6	B...	Yes...	R.....	1⅜	5/16	M....	.....	4	3	No...	3.37	3.00	10	2	1 1/16	1 7/16	2¼	2¼	3	2⅝	2½	3¼
Twin City.....	T,Tr...	4	4¼x6	340.4	B...	Yes...	H....	1½	5/16	M....	31.80	5 3/32	4	Yes...	5.00	7.00	12	2	1¼	2 7/16	2 3/16	2¾	3	3	2 5/16	4
Twin City.....	Tr.....	4	5½x6¾	641.4	B...	Yes...	H....	1¾	7/16	M....	64.00	6¾	5	Yes...	9.75	15.75	14	3 1/16	1 5/16	3 5/16	3	3 1/16	3	3 3 3/32	4	5¾
Twin City.....	Tr.....	4	5 x7½	589.0	B...	Yes...	L.....	2¼	7/16	.....	.....	6½	5	Yes...	10.00	11.00	16	2½	1 7/16	2 5/16	2 5/16	2 5/16-3	3	5½	3	5½
Twin City.....	Tr.....	4	6¼x8	981.7	P...	Yes...	L.....	2½	1 3/32	R....	.....	7¾	4	No...	20.00	18.00	18	2 5/16	1 7/16	3 1/16	3	3-4	3	7 7/32	3 3/16	7 7/32
Twin City.....	Tr.....	4	7¼x9	1486.0	S...	No...	L.....	2 13/16	4 3/64	R....	.....	10	4	No...	33.00	32.00	20½	3 5/16	2 9/16	4 3/16	3½	3½	5	7	3 5/16	6 1 9/16
Twin City.....	Tr.....	6	7¼x9	2229.0	S...	No...	L.....	2 13/16	4 3/64	R....	.....	10	4	No...	33.00	32.00	20½	3 9/16	2 9/16	4 1/16	3½	3½	7	7	3 5/16	6 1 9/16
Waukesha.....BX	T,Tr...	4	3¾x5¼	231.9	B...	Yes...	R.....	1¾	5/16	M....	22.70	3 7/8	4	Yes...	2.75	5.62	10 5/8	2	1	2¼	2	2	3	2¼	2½	3
Waukesha.....FU	T,Tr...	4	4 x5¾	289.0	P...	Yes...	R.....	2	1 1/32	R....	13.20	5 5/16	3	No...	5.31	7.15	12¼	2	1¼	2½	2 3/16	2 3/16	3	2½	3¼	3¼
Waukesha.....R	T,Tr...	4	4¼x5¾	326.3	P...	No...	L.....	2	5/16	R....	26.50	5¼	3	No...	5.00	4.75	11½	2 5/8	1¼	2½	2	2	3	2 5/16	3¼	3½
Waukesha.....CU	T,Tr...	4	4⅝x5¾	345.8	P...	Yes...	R.....	2	1 1/32	R....	13.20	5 5/16	3	No...	5.31	7.15	12¼	2	1¼	2½	2 3/16	2 3/16	3	2½	3¼	3¼
Waukesha.....DU	T,Tr...	4	4½x6¼	397.6	P...	Yes...	R.....	2 1/16	1 1/32	R....	14.60	5 7/16	3	No...	6.54	8.20	13¼	2¼	1 5/16	2¾	2¾	2 9/16	3	2 3/16	2 1/32	2 1/32
Waukesha.....PU7	T,Tr...	4	4¾x6¾	478.4	P...	No...	L.....	2 1/16	1 1/32	R....	38.50	5¾	3	No...	6.62	5.87	12¼	2¾	1½	3	2	2	3	3½	4¼	4½
Waukesha.....EU	T,Tr...	4	5 x6¼	490.8	P...	Yes...	R.....	2 1/16	1 1/32	R....	180.50	6½	3	No...	7.00	9.34	13¼	2½	1 5/16	3¼	2 3/16	2 1/16	3	3¼	4	4
Weidely.....MAA	C.....	4	3¾x5½	242.9	B...	Yes...	H....	1 7/16	5/16	M....	20.30	4 5/16	3	No...	2.90	4.68	11	3½	1	2¼	2	2 1/16	3	2 3/16	2½	4
Weidely.....MA	T,Tr...	4	3¾x5½	242.9	B...	Yes...	H....	1 7/16	5/16	M....	20.30	4 5/16	3	No...	2.90	4.68	11	3½	1	2¼	2	2 1/16	3	2 3/16	2½	4
Weidely.....M	Tr.....	4	4 x5½	276.5	B...	Yes...	H....	1 7/16	5/16	M....	21.80	4½	4	Yes...	3.87	4.62	11	3¼	1	2¼	2	2 1/16	3	2 3/16	3	4
Weidely.....C	C.....	12	2¾x5½	428.5	T...	Yes...	H....	1 15/16	9/32	M....	8.98	3½	3	Yes...	1.90	2.6	10	1 5/16	9/16	2 1/16	2	2 1/16	3	2½	2¾	4

Explanation of abbreviations: Numbers in brackets indicate the column to which reference is made.

(1) **C** = Car; **T** = Truck; **Tr** = Tractor.
(5) **B** = Block; **P** = Pairs; **S** = Singly; **T** = Threes.
(7) **H** = Head; **R** = Right; **L** = Left; **Op** = Opposite; **Sl** = Sleeve.
(10) **R** = Roller; **M** = Mushroom; **R-A** = Rocker Arm.
(29) **I** = Integral; **S** = Separate; **Opt** = Optional.
(30) **C-P** = Centrifugal Pump; **T-S** = Thermo-Syphon; **G-P** = Gear Pump; **Opt** = Optional.
(31) **S-P** = Splash-Pressure; **C-S** = Circulating-Splash; **Pr** = Pressure; **C-P** = Circulating Pressure.
(32-35) **A** = Aluminum; **I** = Iron; **S-S** = Semi-Steel; **P-S** = Pressed Steel.

Passenger Cars, Trucks and Tractors—Continued

Is Cylinder Offset?	If Offset—How Much?	Intake Manifold (Separate or Integral)	Water Circulated By	Lubrication System	Material of Crankcase	Material of Lower Half of Crankcase	Material of Cylinders	Material of Pistons	R.P.M. at Which Maximum H.P. is Developed	R.P.M. at Which Maximum Torque is Developed	Is Governor Fitted?	If so—What Type?	Governed Speed	Maximum Brake H.P. of Average Product	Weight of Engine Without Ignition or Carburetor (Lb.)	Overall Width of Engine (In.)	Overall Height of Engine (In.)	Overall Length of Engine (In.)	Type of Front End Drive	If Chain—What Type?	Adjustable or Non-adjustable	Points of Engine Support	Adapted for Heavy Fuel	Is Bell Housing Provided?	If so—What Number and Type?	MAKE AND MODEL
27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	
No		S	T-S	C-P	S-S	I	S-S	I	2200	1100	Opt.	Own	Opt.	21.0	320	15	24⅛	30	G			3	No	Opt.	4-S.A.E.	LeRoi 2A
No		S	T-S	C-P	S-S	I	S-S	I	2200	1100	Opt.	Own	Opt.	25.0	335	15	24⅛	30	G			3	No	Opt.	3-4 SAE.	LeRoi 2C
No		I	C-P	S-P	I	A	I	I	2650	1200	No.			55.0	490				G			3	Yes.	Yes.	3-4 SAE.	Lewis
No		I	T-S	C-P	I	I	I	I	2550	800	Yes.	Cent.	1650	24.0	375	26⅞	27	37½	G			3	No	Yes.	3-4-5 S.A.E.	Light H
No		I	T-S	C-P	I	P-S	I	I	2100	950	No.			35.0	470	21 11/16	26⅞	38 11/16	G			3	No	Yes.	Spec.	Lycoming K
Yes	⅜	S	Opt.	C-P	I	P-S	I	I	1800	1100	No.			25.0	400	24¼	29⅜	32½	G			Opt.	No	Opt.	3-S.A.E.	Matthews F
No		S	C-P	F	S-S	A	S-S	I	1000	800	Yes.	B	900	40.0	900	24¼	37	46¼	G			3	Yes.	Yes.	Opt.	Minerva A20
Yes	⅜	S	Opt.	C-S	I	I	I	I	1800	800	No.			27.0	480	26	30	36	G			3		Yes.	3-S.A.E.	North American C
Yes	⅜	S	Opt.	C-S	I	I	I	I	1800	800	No.			30.0	480	26	30	36	G			3		Yes.	3-S.A.E.	North American CX
Yes	½	S	C-P	C-S	I	I	I	I	2200	800	No.			57.0	800	26	34	41	C	S	A	3	Yes.	Yes.	2-S.A.E.	North American D
No		S	T-S	C-S	I	I	I	I	1950	1200	Yes.	Cent.	1300	21.0	380	22	29¼	34⅛	G			3	No	Yes.	Spec.	Pittsburg 84
No		S	C-P	Pr	A	A	I	I	2400	1100	No.			70.0	700	27	30½	47¼	G			3	No.	Yes.	3-S.A.E.	Pittsburg 36
No		S	C-P	Pr	I	I	I	I		800	Yes.	Cent.	1000	42.0	950	26	41¼	43¾	G			3	Yes.	Yes.	2-S.A.E.	Pittsburg 85
Yes	⅜	S	C-P	C-S	I	I	I	I			Yes.	Cent.	1000	19.0	490	19⅛	30⅝	33¾	G			4				Red Wing AA
No		I	C-P	C-S	I	I	I	I			Yes.	Cent.	950	22.0	560	20⅜	28½	36¼	G			4				Red Wing F
Yes	⅜	I	C-P	C-S	I	I	I	I			Yes.	Cent.	900	26.0	600	20⅞	28⅜	36¼	G			4				Red Wing B
Yes	4¼	S	C-P	S-P	S-S		S-S	I	600		Yes.	Cent.	600	23.0	875	26¾	24⅝	54	G			4	Yes.	No.		Reliable OO
Yes	7½	I	C-P	S-P	I		S-S	I	710		Yes.	Cent.	710	29.0	1120	45½	25 7/16	44⅝	G			4	Yes.	No.		Reliable VRT
Yes	¼	I	T-S	S-P	A	A	I	I	2500	1100	No.			60.0	750	28¼	34 11/16	45⅝	C	S	N	3	No.	Yes.	3-S.A.E.	R. & V. Knight J
Yes	9/16	I	T-S	S-P	A	A	I	I	2600		No.			43.0	589	28¼	32 11/16	37 11/16	C	S		3	No.	Yes.	3-S.A.E.	R. & V. Knight R
No		I	C-P	S-P	I	P-S	I	I	2450	900	No.			45.0	545	25½	30½	40 13/16	G			3	No.	Yes.	3-S.A.E.	Rutenber 25
Yes	⅝	I	T-S	Pr	I	P-S	I	I	2200	1200	No.			37.0		26	31⅞	34⅝	G			3	No.	Yes.	3-S.A.E.	Supreme S4
Yes	⅝	S	C-P	Pr	I	P-S	I	I	2400	1000	No.					26	31¼	42	G			3	No.	Yes.	3-S.A.E.	Supreme 5K
No		I	C-P	S-P	I	I	I	I	2300	1300	No.			43.5	524	17¾	24 13/16	38 11/16	G			3	No.	Yes.	3-S.A.E.	Teetor 19H
No		I	C-P	S-P	A	A	I	A	1900	1050	No.			85.0		24	28	45	G			4	No.	No.		Teetor 19T
No		I	C-P	Pr	A	A	I	I	2600	1000	No.			75.0	614	17	34	25 29/32	G			3	No.	Yes.	3-S.A.E.	Trego 101
No		I	C-P	Pr	A	A	I	I	2600	1000	No.			65.0	577	18	30	52 29/32	G			3	No.	Yes.	3-S.A.E.	Trego 100
No		S	C-P	P	I	P-S	S-S	I				Fly	1000	40.0	950	25 3/16 – 27	39½	44½ – 44⅝	G			3	Yes.	Yes.	2-S.A.E.	Twin City
No		S	C-P	P	I	A	S-S	I				Fly	900	58.0	1750	29	50	55¾	G			3	Yes.	No.		Twin City
No		I	C-P	S-P	I	I	I	I			Yes.	Own	650	37.0	1900	24½	46¾	51⅞	G			4	Yes.	No.		Twin City
No		S	C-P	S-P	I	I	I	I				Own	600	60.0	2250	36¾	46½	61⅝	G			4	Yes.	No.		Twin City
No		S	C-P	S-P	I	I	I	I				Own	500	68.0	4054	43⅛	62¼	75¼	G			4	Yes.	No.		Twin City
No		S	C-P	S-P	I	I	I	I				Own	500	103.0	5795	45½	62⅞	99¼	G			4	Yes.	No.		Twin City
No		I	C-P	C-S	A	I	S-S	S-S	1800	900	Yes.	Own	1150	28.0	500	20⅜	29	36¾	G			3	Yes.	Opt.	3-S.A.E.	Waukesha BX
Yes	¼	Opt.	C-P	Pr	A	I	I	I	1500	700	Yes.	Own	1000	31.0		30½	38¾	55½	G			3	Yes.	Yes.	2-S.A.E.	Waukesha FU
Yes	½	S	C-P	C-S	A	I	S-S	S-S	1200	800	Yes.	Own	900	32.0	600	20⅜	33½	37¼	G			4	Yes.	Opt.	2-S.A.E.	Waukesha R
Yes	¼	Opt.	C-P	Pr	A	I	I	I	1500	700	Yes.	Own	1000	36.0		30½	38¾	55½	G			3	Yes.	Opt.	2-S.A.E.	Waukesha CU
Yes	¼	Opt.	C-P	Pr	A	I	I	I	1500	650	Yes.	Own	1000	40.0	910	30½	40½	58	G			3	Yes	Yes.	2-3 SAE.	Waukesha DU
Yes	½	S	C-P	C-S	A	A	S-S	S-S	1200	800	Yes.	Own	800	45.0	850	23¾	34	44	G			3	Yes.	Yes.	1-S.A.E.	Waukesha PU7
Yes	½	Opt.	C-P	Pr	A	I	I	I	1400	650	Yes.	Own	1000	50.0	980	30½	40½	62	G			3	Yes.	Yes.	2-3 SAE.	Waukesha EU
No		I	C-P	S-P	I	A	I	S-S	2100	1600	No.			42.0	650	25¾	32	37¾	G			3	No.	Yes.	3-S.A.E.	Weidely MAA
No		I	C-P	S-P	I	I	I	S-S	2000	1600	No.			40.0	750	25¾	32	40	G			3	Yes.	Yes.	3-S.A.E.	Weidely MA
No		I	C-P	S-P	I	I	I	S-S	1600	1200	Yes.	Cent.	Opt.		770	24 9/16	32	39 7/16	G			4	Yes.	No.		Weidely M
No		S	C-P	S-P	A	A	I	S-S	2400	1100	No.			78.0	750	26	33 5/16	51	G			3	No.	Yes.	3-S.A.E.	Weidely C

(46) G = Gear; C = Chain.

(47) S = Silent.

(48) A = Adjustable; N = Non-Adjustable.

*Beaver models CK and CL crankshaft diameter: Front, 2¼; center, 2 5/16; rear, 2⅜.

**Other intermediate crankshaft bearings are of similar length to first intermediate.

Canadian Duties on Automobile Accessories

BY a ruling of the Canadian Department of Customs, published as Appraisers' Bulletin No. 2018, the tariff classifications shown below will apply to the parts for automobiles enumerated when such articles are shipped and billed separately for manufacturing purposes or for repairs. The war surtax has been included where applicable. Imports from the United States are subject to the general tariff rates. The tariff items, together with the ad valorem rates, and the articles classed under each, are as follows:

Item 312.—Asbestos manufactures, general, 32½ per cent; preferential, 15 per cent; brake-band lining, asbestos only.

Item 352.—Manufactures of brass or copper, not otherwise specified, general, 37½ per cent; preferential, 20 per cent; battery box brass, parts; bells; acetylene tanks (brass); brake-band lining, asbestos, with brass wires imbedded therein; brake-band lining, cotton, with brass wires imbedded therein; brass castings; brass-pipe fittings; carbureters; cocks, brass; fuel level indicator, brass; gasoline engine fittings, brass; gasoline syphon, brass; gasoline tank gages, brass; generators, acetylene, brass; grease cups, brass; horns, brass, if not plated; brass oil cans, oil cups, oil guns, and oil hole covers; tanks, copper; vaporizers, brass; and castings, rough, if of brass.

Item 354.—Manufactures of aluminum, not otherwise specified, general, 32½ per cent; preferential, 15 per cent; aluminum castings, including rough castings.

Item 362—Nickel-plated articles, general, 42½ per cent; preferential, 22½ per cent; horns, brass, if plated.

Item 392.—Springs and axles, general, 42½ per cent; preferential, 22½ per cent; axles; springs, vehicle.

Item 435.—Lamps, side lights and headlights, etc., general, 37½ per cent; preferential, 20 per cent; lamps; lamp parts, metal; portable electric lights.

Item 438.—Automobiles and motor vehicles of all kinds, general, 42½ per cent; preferential, 22½ per cent; automobile covers (tops); bodies, complete; chassis; tops; wheels.

Item 453.—Electric motors and apparatus, machinery of iron or steel, etc.; general, 35 per cent; preferential, 15 per cent; ammeters; roller and ball bearings; boilers; castings, rough, of iron or steel; charging apparatus, electric; commutators; differential gears; electric auto motors; engine parts, integral, if iron or steel; gasoline auto engines; igniters; ignition apparatus and batteries; iron castings, finished, if engine parts; insulators; lamp storage batteries; piston rings; pumps, iron or steel, operated by engine; spark coils; spark gaps; spark plugs; storage batteries; switches, electric; transmission gears; valves, engine, if iron or steel; volt ammeters; voltmeters.

Item 454.—Manufactures of iron and steel, not otherwise specified, general, 37½ per cent; preferential, 20 per cent; antiskid rivets (steel); bodies, steel, unfinished and upholstered; boiler parts of iron or steel; hoods; brakes; brake drums; chain adjusters; chains, nonskids; clips and clamps, iron or steel; clutches, iron or steel; frames, or with engines attached, but without axles or springs; gears and pinions, iron or steel, steering; hubs, with sprockets attached; iron castings other than rough castings or finished castings of engine parts; lock nuts, iron or steel; luggage carriers, racks of iron or steel; pressed steel body frames; pressed steel channels and angles; radiators, iron or steel; rims, steel; sprockets; tanks, iron.

Specifications

MAKE AND MODEL	Designed for: (Cars or Trucks)	Load Capacity (Lb.) (Truck Axles Only)	Type	Final Drive	GEAR RATIOS						Diameter of Axle Shafts	Range of Spring Centers		Provision for Torque Taken on
						Standard		Optional				Maximum	Minimum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Clark.....AW	T.	2,000	FF	I-G	6.75						1⅛	39½	38½	Sp.
Clark.....1D	T.	3,000	FF	I-G	6.80	7.25	7.60				1⅛	39½	38½	Sp.
Clark.....2D	T.	4,500	FF	I-G	8.00	9.10					1½	39	38½	Sp.
Clark.....3D	T.	7,000	FF	I-G	10.00	11.50					1½	42½	40	Sp.
Clark.....5D	T.	10,000	FF	I-G	12.50						1¾	42½	40	Sp.
Columbia.....10	C.		¾-F	Sp.B	4.60			5.10			1¼	40	37	Sp.&Ta.
Columbia.....30	C,T.	1,500	¾-F	Sp.B	4.60			5.00			1⅜	42	36	Sp.&Ta.
Columbia.....50	C,T.	2,000	¾-F	Sp.B	4.40			4.00			1⅜	40	36	Sp.&Ta.
Columbia.....70	T.	3,000		I-G	7.00			8.00	6.00		1½	40	37	Sp.
Columbia.....85	T.	5,000		I-G	8.00			7.00	9.10		1¼	40	37	Sp.
Empire.....B	T.	1,500	½-F	W	4.30	6.20		5.00			1¾	41	38	Sp.
Empire.....L	T.	3,000	½-F	W	4.30	7.20	7.25	7.75	6.20	8.75	2⅛	41½	38	Sp.
Empire.....N	T.	4,000	½-F	W	4.25	7.20	7.25	7.75	6.20	8.66	2⅜	41½	38	Sp.
Empire.....O	T.	6,000	½-F	W	6.00	7.75	*8.40	6.50	10.66		2⅜	41	38	Sp.
Empire.....12	T.	8,500	½-F	W	10.30	11.75		6.80	8.75		3⅛	46	39	Sp.
Kenosha.....30	T.	4,000	Dead	I-G	6.75			6.00	8.00			41	38	Sp.
Lewis.....168	C.		FF	Sp.B	12.53						1⅜	35		T.T
Peru.....	C.		FF	Sp.B	4.27	4.25		4.50	4.70		1⅛	42	35	Opt.
Russel.....P300	T.	2,000		I-G	7.70			6.80	8.20			40½	38	Sp.
Russel.....S300	T.	4,000		I-G	7.40	7.80		8.80	10.20			40¼	39¼	Sp.
Russel.....W400	T.	6,000		I-G	10.90	9.40		8.40	7.80			40¾	39¾	Sp.
Salisbury.....	C.		¾-F	Sp-B	4.50			4.75			1⅜	39	34¾	Sp.&Ta.
Salisbury.....	C.		¾-F	Sp-B	4.50			4.75			1⅜	41⅜	34¾	Sp.&Ta.
Salisbury.....	C.		¾-F	Sp.B	4.50			4.75	4.12		1½	41⅜	34¾	Sp.
Sheldon....W1001	T.	3,000	S-F	W	6.10						1²1⁄32	40½	39	Sp.
Sheldon....W1501	T.	4,000	S-F	W	6.50			7.80			2¹1⁄64	39	35	Sp.
Sheldon....W103	T.	7,000	S-F	W	7.75			6.50	8.60		2⅜	38¾	32½	Sp.
Sheldon....W21	T.	8,000	S-F	W	7.75	8.75					2¾	39	32	Sp.
Sheldon....W31	T.	12,000	S-F	W	8.75			10.25			3⅜	44	38	Sp.
Sheldon....W51	T.	18,000	S-F	W	8.75			10.25			3¾	46	43	Sp.
Spacke.....M	C.		¾ F	Sp.B	4.40	4.90	4.70				1¼	41	35	Sp.&Ta.
Standard.....C	T.	5,000	S-F	W	7.75			8.66			2³⁄32	41½	38¾	Sp.
Standard.....C-2	T.	6,000	S-F	W	7.75			8.66			2³⁄32	41½	36½	Sp.
Standard.....C-4	T.	7,500	S-F	W	8.66			9.25			2⅜	4½	36½	Sp.
Timken...5151&2	C.		S-F	B	4.66			5.09	5.60		1¼	40¼	38½	Sp.
Timken...5031&2	C.		S-F	B	4.35			3.76	4.08	4.90	1¼	41	38	Sp.
Timken.....5762	C.		FF	B	4.35			3.76	4.08	4.90		39½	37½	TA
Timken.....6352	T.	2,000	S-F	W	7.20			6.20	8.25		1½	39		Sp.
Timken.....6460	T.	3,000	S-F	W	7.00			7.75	8.75	9.25	1¾	39		Sp.
Timken.....6560	T.	4,000	FF	W	7.75			8.50	9.25		1⅝	39		Opt.
Timken.....6652	T.	6,000	FF	W	10.33			7.80	8.75	12.00	1¹5⁄16	43¾		Opt.
Timken.....6752	T.	10,000	FF	W	11.66			10.25	13.66		2⅛	46		TA
Torbensen..OX2L	T.	2,700	FF	I-G	6.50			5.33	8.00		1⁹⁄16	40½	37	Sp.
Torbensen.....A	T.	4,200	FF	I-G	7.00			8.00			1¾	39½	37½	Sp.
Torbensen.....B	T.	5,400	FF	I-G	7.60			6.10	8.50		2	39½	37	Sp.
Torbensen.....C	T.	7,000	FF	I-G	8.00			9.00			2⅛	39	38	Sp.
Torbensen.....D	T.	7,500	FF	I-G	8.20			6.60	9.10		2⅛	39½	37	Sp.
Torbensen....E-2	T.	11,000	FF	I-G	10.20			8.90			2¾	44	42	Sp.
Torbensen.....G	T.	14,000	FF	I-G	10.20			8.90			3³⁄32	44	42	Sp.
Torbensen.....														
Wisconsin..800-G	T.	4,000	S-F	W	7.75			6.20	8.66		2⅛	40	38	Sp.
Wisconsin..800-H	T.	5,500	S-F	W	8.25			7.25	9.33		2⅛	40	38	Sp.
Wisconsin..800-J	T.	7,300	S-F	W	8.66			7.75	9.75		2⅛	40	38	Sp.
Wisconsin..900-C	T.	8,800	S-F	W	2.66			9.66			3	41	38½	Sp.
Wisconsin..900-D	T.	12,000	S-F	W	10.00			9.00	11.75		3⅜	40½	39	Sp.
Wisconsin..1000-A	T.	16,000	S-F	W	11.75						3¾	45	40	Sp.

*Also 9.66

# of Stock Axles

Provision for Radius Rods	Type of Differential	SERVICE BRAKE				EMERGENCY BRAKE			TYPE OF BEARINGS		Wheel Tread (In.)	Weight of Axle (Complete Unit Without Wheels)	Housing Material	Axle Shaft Material
		Location of Drum	Diameter of Drum	Width of Drum	External or Internal	Diameter of Drum	Width of Drum	External or Internal	In Differential	In Wheels				
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
No	B.	R-W	14	1¾	Ext.				Roller	R.&B.	56	410	M-I.	Nickel steel
No	B.	R-W	16	2½	Ext.	15½	1½	Int.	Roller	R.&B.	56	510	C-S.	Nickel steel
No	Opt.	Opt.	16½	3	Ext.	16	2½	Int.	Roller	R.&B.	58	760	C-S.	Nickel steel
No	B.	R-W	20	3	Ext.	19¼	2½	Ext.	Roller	R.&B.	68	950	C-S.	Nickel steel
No	B.	R-W	22						Roller	R.&B.	65	1280	C-S.	Nickel steel
No	B.	R-W	12	2½	Ext.			Int.	Roller	Ball	56	231	P-S.	Nickel steel
No	B.	R-W	14	2½	Ext.			Int.	Roller	Ball	56	265	P-S.	Nickel steel
No	B.	R-W	16	3	Ext.			Int.	Roller	Roller	56	320	P-S.	Nickel steel
No	B.	R-W	15	3¼	Ext.			Int.	Roller	Roller	56	385	P-S.	Nickel steel
No	B.	R-W	18	3½	Ext.			Int.	Roller	Roller	60	675	P-S.	Nickel steel
No	S-L.	R-W	13½		Int.	13½	4¾	Int.	Ball	Ball	56	300	C-S.	S.A.E. 2340
No	S-L.	R-W	13½	4¾	Int.	13½	4¾	Int.	Ball	Ball	58	450	S-S.	S.A.E. 2340
No	S-L.	R-W	13½	4¾	Int.	13½	4¾	Int.	Ball	Ball	58	500	S-S.	S.A.E. 2340
No	S-L.	R-W	18	5	Int.	18	5	Int.	Ball	Ball	60½	750	C-S.	S.A.E. 2340
No	S-L.	R-W	20	6¼	Int.	20	6¼	Int.	Ball	Ball	68	1200	S-S.	S.A.E. 2340
Yes	Opt.	D-S.	7	4					R.	Ball	56	300	C-S.	Alloy Steel
No	Bev.	R-W	12	2	Ext.	12	2	Int.	Ball	Ball	56	200	M.	S
No	B.	R-W	12	1¾	Ext.	12	1¾	Int.	Roller	Roller	56	200	M-I.	Chrome steel
No	Sp.	R-W			Ext.			Int.	B.&R.	B.&R.	56			Alloy steel
No	Sp.	R-W			Ext.			Int.	B.&R.	B.&R.	59⅞			Alloy steel
No	S.&B.	R-W			Ext.			Int.			60 9/16			Alloy steel
No	B.	R-W	12 9/16	2	Ext.	12	2	Int.	Roller	Ball	56	284	P-S.	Ch.Ni. steel
No	B.	R-W	14⅜	2	Ext.	14	2	Int.	Roller	R.&B.	56	300	P-S.	Ch.Ni. steel
No	B.	R-W	16⅜	2	Ext.	16	2	Int.	Roller	R.&B.	56	350	P-S.	Ch.Ni. steel
No	B.	R-W	14	1¾	Int.	14	1¾	Int.	Ball	R or B	56		M-I.	Nickel steel
No	B.	R-W	16	2	Int.	16	2	Int.	Ball	R or B	57		M-I.	Nickel steel
No	B.	R-W	16	2	Int.	16	2	Int.	Ball	R or B	60		M-I.	Nickel steel
No	B.	R-W	18	2¼	Int.	18	2¼	Int.	Ball	R or B	58		M-I.	Nickel steel
Yes	B.	R-W	20	2½	Int.	20	2½	Int.	Ball	R or B	69¾		M-I.	Nickel steel
Yes	B.	R-W	24	3	Int.	24	3	Int.	Ball	R or B	73¼		C-S.	Nickel steel
No	B.	R-W	14	1¾	Ext.	14	2	Int.	Roller	R or B	56	235	P-S.	S.A.E. 3135
Yes	B.	R-W	14	4⅝	Int.	14	4⅝	Int.	Ball	Ball	56	475	M-I.	Alloy steel
Yes	B.	R-W	14	4⅝	Ext.	14	4⅝	Int.	Ball	Ball	56	500	C-S.	Alloy steel
Yes	B.	R-W	16	4⅝	Ext.	16	4⅝	Int.	Ball	Ball		700	C-S.	Alloy steel
No	B.	R-W	14 5/16	2¾	Ext.	14	2¾	Int.	Roller	Roller	56	267	Steel	S.A.E. 3140
No	B.	R-W	15½	3 1/16	Ext.	15 5/16	3 1/16	Int.	Roller	Roller	56	300	Steel	S.A.E. 3140
No	B.	R-W	16	3½	Ext.	15⅝	3½	Int.	Roller	Roller	56	381	Steel	S.A.E. 3140
No	B.	R-W	15	4⅛	Ext.	15	4⅛	Int.	Roller	Roller	58½	408	Steel	S.A.E. 3140
No	B-Sl.	R-W	16	4 9/16	Int.	16	4 9/16	Int.	Roller	Roller	58	649	Steel	S.A.E. 3140
Yes	Opt.	R-W	18	5 11/16	Int.	18	5 11/16	Int.	Roller	Roller	58½	821	Steel	S.A.E. 3240
Yes	Opt.	R-W	21	5¾	Int.	21	5¾	Int.	Roller	Roller	65¼	1245	Steel	S.A.E. 3240
Yes	Opt.	R-W	24	5⅞	Int.	24	5⅞	Int.	Roller	Roller	69½	1724	Steel	S.A.E. 3240
No	S-L.	R-W	14	2	Ext.	14	2	Int.	Roller	Roller	56	285	Forg.	Nickel steel
No	S-L.	R-W	15	2½	Ext.	15	2½	Int.	Roller	Roller	56	365	Forg.	Nickel steel
No	S-L.	R-W	17	2¼	Int.	17	2¼	Int.	Roller	Roller	56	506	Forg.	Nickel steel
No	S-L.	R-W	18	2½	Ext.	18	2½	Int.	Roller	Roller	56	560	Forg.	Nickel steel
No	S-L.	R-W	20	2½	Ext.	20	2½	Int.	Roller	Roller	58	596	Forg.	Nickel steel
No	S-L.	R-W	19	3½	Int.	10	4½	Ext.	Roller	Roller	67½	975	Forg.	Nickel steel
No	S-L.	R-W	19	3½	Int.	10	4½	Ext.	Roller	Roller	67½	1100	Forg.	Nickel steel
Yes	B.	R-W	17	2½	Int.	12¼	2½	Int.	Ball	Opt.	56	550	M-I.	Nickel steel
Yes	B.	R-W	20	2½	Int.	15	2½	Int.	Ball	Opt.	57	640	M-I.	Nickel steel
Yes	B.	R-W	20	2½	Int.	15	2½	Int.	Ball	Opt.	57¾	700	M-I.	Nickel steel
Yes	B.	R-W	20	2½	Int.	15	2½	Int.	Ball	Opt.	59½	975	M-I.	Nickel steel
Yes	B.	R-W	20	2½	Int.	15	2½	Int.	Ball	Opt.	60	1020	M-I.	Nickel steel
Yes	B.	R-W	24	3½	Int.	18½	3½	Int.	Ball	Opt.	67	1400	M-I.	Nickel steel

Item 491.—Steel balls, adapted for use on bearings of machinery and vehicles, general, 17½ per cent; preferential, free; steel balls.

Item 506.—Manufactures of wood, not otherwise specified, general, 32½ per cent; preferential, 17½ per cent; bent woodwork, unfinished.

Item 562.—Oiled cloth and tape, not otherwise specified, general, 37½ per cent; preferential, 20 per cent; tire repair tape.

Item 567.—Manufactures of wool or worsted, not otherwise specified, general, 35 per cent; preferential, 30 per cent; felt washers and dust rings.

Item 592.—Vehicles, not otherwise specified, and rubber tires, general, 42½ per cent; preferential, 22½ per cent; tires, rubber; tire repair kits; tire valves and stems.

Item 609.—Belting, of leather, general, 30 per cent; preferential, 15 per cent; belts, fan, leather.

Item 613.—Manufactures of leather, not otherwise specified, general 32½ per cent; preferential 15 per cent; foot bellows for horn, leather.

Item 619.—Rubber manufactures, general, 42½ per cent; preferential, 22½ per cent; engine packing, rubber; mats, rubber.

Item 622.—Trunks, bags, baskets, not otherwise specified, general, 37½ per cent; preferential, 20 per cent, hampers; tool bags.

Item 657.—Cyclometers and pedometers, general, 32½ per cent; preferential, 17½ per cent; cyclometers; grademeters; speed indicators; motometers, odometers.

Item 711.—Articles not otherwise specified, general, 25 per cent; preferential, 15 per cent; carbide.

Articles Rated According to Material

The articles enumerated below are to be rated according to material:

Castings, rough; chain repairers, chain guard; cushions; dashes and fenders; dust shields; gear cases; hose clamps and menders; housings; axles; jacks; lamp brackets; lubricators; mud guards; mudguard attachments; mufflers; pumps; tires; pumps, oil; pumps, water; pumps, brass, circulation; pump connections; steering apparatus; steering knuckles; steering wheels; steering levers; steering yokes; steps; tire protectors and antiskids; tire repair tools; universal joints; vulcanizers; windows, curtains; windshields.

Clocks and forgings are classified with other clocks and forgings under items 368 and 393, respectively.

The Tractor in Egypt

THE people of Egypt show signs of breaking away from the custom of waiting for the Nile to overflow in order to plant seed. "'Cast thy bread upon the waters" is a proverb which is being uprooted by the prosaic farm tractor, and the market thus opened is widening daily.

The market is peculiar, however, because the physical conditions are peculiar. Many sections of the country are cut up by irrigation canals, over which are light bridges that must be crossed frequently by the tractors and other farm machinery. The tractor must be light, ranging in weight from 2,500 to 4,500 lbs. There is a demand for about two sizes of tractors, one of which should be capable of plowing five acres a day, and the other fifteen acres.

The fuel most readily vailable for tractor use in Egypt is kerosene, which can be obtained in all sections of the country, while gasoline can be had only in the large centers and costs 65 cents a gallon, although the pre-war price was as low as 25 cents. Kerosene can be purchased for 30 cents the gallon now, and normally sells at 18 cents. A factor tending to cheapen fuel is the discovery of oil fields in Palestine and the Red Sea Coast.

Specifications of Stock Gearsets

MAKE AND MODEL	Designed for	Type Clash or Individual Clutch	BEARINGS		Number of Speeds	WIDTH OF GEAR FACES					Gear Teeth Pitch	GEAR RATIOS					Gearset Location	Control Location	Housing Material	Shaft Material	Gear Material	Sold with Clutch?	Weight Lb. (With Controls but Without Clutch
			Main Shaft	Secondary Shaft		Const. Mesh Set	Low	1st Inter.	2nd Inter.	Reverse		First	Second	Third	Fourth	Reverse							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
American.....3-17	C	Clash	B	B	3	5/8	3/4	3/4	3/4	3/4	6-8	3.33	1.68	1.00	....	4.35	U	C	C.I. or A.	Nickel Steel	Nickel Steel	No	.....
American.....3-20	C, T	Clash	R	R	3	3/4	7/8	7/8	7/8	7/8	6-8	3.36	1.76	1.00	....	4.32	A	C-S	C.I. or A.	Nickel Steel	Nickel Steel	No	.....
American.....3-18A	T	Clash	R	R	3	7/8	1	1	1	1	6-8	3.36	1.76	1.00	....	4.32	A	S	C.I	Nickel Steel	Nickel Steel	No	.....
Campbell.....50	T	Ind. Cl.	B	B	4	7/8	7/8	7/8	7/8	7/8	6-8	4.00	2.62	1.50	1.00	4.81	A	Opt	C.I	S.A.E. 2340	S.A.E. 2340	No	175
Campbell.....C	C	Ind. Cl.	B	R	3	3/4	3/4	3/4	3/4	3/4	6-8	3.52	1.75	1.00	....	3.85	U	C	G.I.,M.I.A.	S.A.E. 2340	S.A.E. 2340		.....
Cotta.....12-S-R	T	Ind. Cl.	B	B	3	1½	1½	1½	....	1½	4½-5½	4.51	1.81	....	1.00	6.00	A	C	S-St.	Nickel Steel	Nickel Steel	No	.....
Cotta.....12-C-R	T	Ind. Cl.	B	B	3	1½	1½	1½	....	1½	4½-5½	4.51	1.81	....	1.00	6.00	A	C	S-St.	Nickel Steel	Nickel Steel	No	.....
Cotta.....S-S	T	Ind. Cl.	B	B	3	1¼	1¼	1¼	....	1¼	4½-5½	4.51	1.81	....	1.00	6.00	A	C	S-St.	Nickel Steel	Nickel Steel	No	.....
Cotta.....A&AU	T	Ind. Cl.	B	B	4	3/4	3/4	3/4	3/4	3/4	6-8	5.20	3.68	1.86	1.00	4.66	*	C-S	S.S. or A.	S.A.E. 3140	S.A.E. 3120	Opt	.....
Cotta.....R&RU	T	Ind. Cl.	B	B	4	1	1	1	1	1	5½-7½	5.20	3.68	1.86	1.00	4.66	*	C-S	S.S. or A.	S.A.E. 3140	S.A.E. 3120	Opt	.....
Cotta.....S&SU	T	Ind. Cl.	B	B	4	1¼	1¼	1¼	1¼	1¼	5-7	5.20	3.68	1.86	1.00	4.66	*	C-S	S.S. or A.	S.A.E. 3140	S.A.E. 3120	Opt	.....
Cotta.....T	T	Ind. Cl.	B	B	4	1½	1½	1½	1½	1½	4½-6	5.20	3.68	1.86	1.00	4.66	A	C-S	S.S. or A.	S.A.E. 3140	S.A.E. 3120	Opt	.....
Cotta.....AA&AU	T	Ind. Cl.	B	B	3	3/4	3/4	3/4	3/4	3/4	6-8	4.00	2.00	1.00	....	4.66	*	C-S	S.S. or A.	S.A.E. 3140	S.A.E. 3120	Opt	.....
Cotta.....RA&RAU	T	Ind. Cl.	B	B	3	1	1	1	1	1	5½-7½	4.00	2.00	1.00	....	4.66	*	C-S	S.S. or A.	S.A.E. 3140	S.A.E. 3120	Opt	.....
Cotta.....SA&SAU	T	Ind. Cl.	B	B	3	1¼	1¼	1¼	1¼	1¼	5-7	4.00	2.00	1.00	....	4.66	*	C-S	S.S. or A.	S.A.E. 3140	S.A.E. 3120	Opt	.....
Covert.....RA3&RU3	C, T	Ind. Cl.	B	B	3	15/16	1	15/16	....	15/16	6-8	3.60	1.60	1.00	....	4.37	*	C-	C.I	S.A.E. 2320	S.A.E. 2320		.....
Covert.....TA	T	Ind. Cl.	B	B	4	1¾	1 7/16	1¾	1⅜	1¾	4-5	5.33	3.08	1.57	1.00	7.13	A		C.I	S.A.E. 2320	S.A.E. 2320	No	314
Covert.....RA4&RU4	T	Ind. Cl.	B	B	4	15/16	1¼	1	15/16	1 1/16	6-8	4.75	2.70	1.60	1.00	5.95	*	C	C.I	S.A.E. 2320	S.A.E. 2320		.....
Covert.....L	C	Ind. Cl.	B. & R.	R	3	1 1/16	1 1/16	1 1/16	....	1 1/16	7-9	3.61	1.82	1.00	....	4.50	U	C	C.I	S.A.E. 2320	S.A.E. 2320	No	.....
Covert.....SA	T	Ind. Cl.	R	R	4	1¼	1 3/16	1¼	1⅛	1¼	5-7	5.07	3.04	1.63	1.00	6.70	A		C.I	S.A.E. 2320	S.A.E. 2320	No	237
Covert.....MUC-MA	C, T	Ind. Cl.	B	B	3	1 5/16	1 5/16	1 5/16	....	1 5/16	6-8	3.66	1.91	1.00	....	4.46	*		C.I	S.A.E. 2320	S.A.E. 2320	Yes	.....
Detroit.....Dy	C, T	Clash	B. & P.	P	3	3/4	3/4	3/4	3/4	3/4	7-9	3.20	1.70	1.00	....	3.88	U	C	G.I. or A.	Alloy Steel	Alloy Steel	Opt	.....
Detroit.....C$_2$	C, T	Clash	B. & R.	B	3	3/4	7/8	7/8	7/8	7/8	6-8	3.20	1.88	1.00	....	3.88	U	C	G.I. or A.	Alloy Steel	Alloy Steel	Opt	.....
Detroit.....H	T	Clash	B. & R.	B	4	7/8	1	1	1	1	6-8	4.40	3.08	1.76	1.00	5.28	U-A	C	G.I.	Alloy Steel	Alloy Steel	Opt	.....
Durston.....C, T	C, T	Clash	B	P	3	5/8	7/8	5/8	....	7/8	6-8	3.09	1.85	1.00	....	3.87	U	C		Chr.N.S.	Nickel St.	No	95
Fuller.....H	T	Clash	B	B	4	1¼	1½	1 3/8	1¼	1¼	4½-6	6.00	3.20	1.70	1.10	6.30	A	Opt	C.I	Nickel St.	Nickel St.	No	200
Fuller.....L1	T	Clash	B	B	3	1 5/16	7/8	2 3/32	....	1 5/16	6-8	4.00	1.70	1.00	....	3.50	A	Opt	C.I	Nickel St.	Nickel St.	No	185
Fuller.....LTU5	T	Clash	B	B	3	1 3/16	7/8	2 1/32	....	1 3/16	6-8	4.00	1.70	1.00	....	3.50	U	C	C.I	Nickel St.	Nickel St.	Yes	165
Fuller.....GU5	C, T	Clash	B	B	4	1	1 1/16	7/8	7/8	7/8	5-7	4.80	3.00	1.60	1.00	6.50	U	C	C.I	Nickel St.	Nickel St.	Yes	213
Fuller.....G5	T	Clash	B	B	4	1	1 1/16	7/8	7/8	7/8	5-7	4.80	3.00	1.60	1.00	6.50	A	Opt	C.I	Nickel St.	Nickel St.		133
Fuller.....TU5	C, T	Clash	B	B	3	1 5/16	7/8	2 1/32	....	1 5/16	6-8	3.00	1.70	1.00	....	3.50	U	C	C.I	Nickel St.	Nickel St.	Yes	160
Fuller.....TU3¼	C, T	Clash	B	B	3	1 5/16	7/8	2 1/32	....	1 5/16	6-8	3.00	1.70	1.00	....	3.50	U	C	C.I	Nickel St.	Nickel St.	Yes	150
Grant-Lees.....K	C, T	Clash	B	P	3	9/16	5/8	5/8	....	5/8	7	3.00	1.89	1.00	....	3.62	U	C	S.S.	Nickel St.	Nickel St.	No	80
Grant-Lees.....515	C, T	Clash	B	B	3	1 1/16	3/4	3/4	....	1 1/16	6	2.98	1.73	1.00	....	3.90	U	C	S.S.	Nickel St.	Nickel St.	No	107
Grant-Lees.....	C	Clash	B	B	3	1 1/16	1 1/16	3/4	....	3/4	6-8	2.71	1.57	1.00	....	3.54	U	C	C.I	Nickel St.	Nickel St.	No	135
Muncie.....T23N	C	Clash	B	B	3	3/4	1 3/16	2 3/32	....	1 3/16	6-8	2.70	1.60	1.00	....	3.60	U	C	C.I	S.A.E. 3120	S.A.E. 3120	Opt	.....
Muncie.....T25	C	Clash	B	Opt	3	5/8	3/4	1 1/16	....	3/4	6-8	2.60	1.70	1.00	....	3.40	U	C	C.I	S.A.E. 3120	S.A.E. 3120	No	95
Muncie.....T63	T	Clash	B	B	4	7/8	7/8	7/8	7/8	7/8	5	4.46	2.07	1.32	1.00	3.90	U	C	C.I	S.A.E. 3120	S.A.E. 3120	Opt	.....
Savage.....T	T	Clash	B	B	4	1	1½	1¼	1⅛	1½	5-7	4.75	2.94	2.02	1.00	5.87	A	S	C.I	Chrome St.	Chrome St.	No	320
Warner.....T6	C	Clash	B	R	3	5/8	3/4	3/4	....	3/4	6-8	3.24	1.63	1.00	....	4.05	U	C	M.I.	S.A.E. 1045	S.A.E. 2345	Opt	100
Warner.....T38L	C, T	Clash	B	B	3	3/4	3/4	3/4	....	3/4	6-8	3.66	1.81	1.00	....	4.58	U	C	M.I. or A.	S.A.E. 1025	S.A.E. 2345	Yes	120
Warner.....T53	T	Clash	B	B	4	1	1 3/8	1¼	1¼	1¼	5-7	4.99	3.16	1.79	1.00	5.78	A		M.I.	S.A.E. 2320	S.A.E. 2345	No	190
Warren.....A	C	Clash	B	B	3	1 1/16	3/4	3/4	....	3/4	6-8	3.52	1.70	1.00	....	4.40	U	C	C.I	S.A.E. 3120	S.A.E. 2320	No	100
Warren.....B	C	Clash	B	P	3	9/16	5/8	5/8	....	5/8	7-9	2.98	1.73	1.00	....	3.62	U	C	C.I	S.A.E. 3120	S.A.E. 2320	No	85

*Cotta and Covert models having U in model number, gearset is placed in unit with engine. Otherwise gearset is amidship.

S. A. E. Standardization Work in 1919

Progress has been steady and the results will aid the manufacturer in quantity production. Release from war activities gave impetus to trade betterment idea. An extensive program for the coming year has already been commenced

AERONAUTIC spark-plug shell dimensions have been revised with a view of bringing present practice to the plane of a much-desired international standard. The adopted design follows that recommended by the British Engineering Standards Association, except that the maximum projection is 3 in. instead of 3½ in. and the length of the threaded portion is 13/32 in. instead of 21/64 in. The number of threads is approximately seven instead of five. The changes will not prevent the use of these spark-plugs in British engines, while the standard sizes are already in use on a large number of American machines.

Sizes of nuts for machine screws were considered carefully, and the table submitted by the Miscellaneous Division in conjunction with the A. S. M. E. Committee was finally adopted, after consultation with the leading manufacturers. The divergence between these sizes and those formulated by the Aeronautic Division a year ago was not thought objectionable, as machine screw nuts, on account of large tolerances and width limits, are considered undesirable for aircraft work. The Aeronautic Division has deviated from automobile practice in making the thickness of the nut three-fourths the diameter, instead of seven-eighths, and has also selected an additional series of thin nuts. In standardizing machine screw nuts, the idea of keeping down the number of wrench sizes was borne in mind. Also, the short diameters were specified, and the long dimensions were not added, because users would complain of error if approximate fractions were given. The short diameter is all that is required for manufacturing purposes, and it was contended that a separate sheet of long diameters is an easy thing to provide for purposes of designing and calculating clearances.

Leaf springs came in for a thorough revision, owing to the fact that many of the older forms had become obsolete. The series described a little farther on in this article has been adopted and is thought to be ample for all commercial requirements. The changes were made with a view of including standard articles to be had on the market.

Freed from war requirements, standardization during the past year has proceeded along broad industrial lines. Electrical equipment, engine construction, bearings, springs, iron and steel, lighting, tractor, motorcycle, transmission, truck, miscellaneous, tire and rim divisions, all contributed their share to the progress.

Referring to the subject of ball bearings, additions to the list of separable (open) type bearings have resulted in a more regular and logical progression in bore sizes than in outside diameters; it was thought undesirable, however, to change widespread practice merely for the sake of being academic. In the past, these bearings were generally known as magneto bearings, owing to their accepted use for that purpose, both here and abroad.

A sleeve or cylindrical type of mounting for starting motors was adopted as the S. A. E. standard, on the recommendation of the Electrical Equipment Division. A cylindrical portion of the gearshift housing slides into a bored hole in the bell housing. The arrangement is intended mainly for outboard mesh installation and is not well suited to inboard construction.

Owing to differences of opinion regarding specifications for non-magnetic shims for magnetos mounted on cast-iron pads, the subject was reconsidered during the year, with the result that ½ in. shims and bronze bolts were adopted, and the thickness of the shim is to be added to the distance from the face of the mounting pad to the center of the magneto shaft as given in the S. A. E. magneto dimension table. A grid construction for the shims is considered preferable.

Owing to the rapid growth of the farm lighting plant industry, the matter of rating batteries for this service has been the subject of careful consideration for some time. It was felt that the old way of rating batteries by the 8-hr. or other short discharge period did not indicate the capacity under usual working conditions. A standard method of determining battery capacity has been adopted, according to which the rating shall be determined at an initial temperature of 80 deg. Fahr., and the rated capacity of farm-lighting batteries shall be based on a final voltage of not less than 1.75 volts per cell for lead batteries.

The period of discharge corresponding to the rated ampere-hour capacity is to be definitely stated. In the rating of farm-lighting batteries, which discharge intermittently or over prolonged periods, the maximum capacity rating is to be limited to that obtained over a period of 72 hours. Standard tests are to be at the rate of one-twenty-fourth of the ampere-hour capacity of the battery for an initial period of four hours, followed by a sixteen-hour rest, and then by two eight-hour periods, each followed by a sixteen-hour rest. After the last rest, the final discharge period is to be four hours.

These rules are applicable to nickel-iron batteries also, except the final voltage per cell. The short initial periods of testing make it possible to commence the tests at noon and end at noon. It has been the custom to give the eight hour ratings, from which manufacturers can arrive at ratings for other periods if desirable, but the public ordinarily is not able to do this, and it was felt that the 72-hour rating conveyed to the average user the impression that he is obtaining maximum returns for his money. This is very desirable from the point of view of the salesman, and really makes no difference from the scientific standpoint.

Standardization of tractor wheels and component parts has been considered and carried through as far as thought desirable, leaving to the future the completion of this work. There has been a demand for definite standards on account of the tendency toward legislative action and also on account of the wide diversity in design and dimensions, frequently in opposition to the best engineering practice.

Revision was made in the list of pneumatic tires and

rim sizes for passenger cars and commercial vehicles in conformity with the joint recommendations of the National Automobile Chamber of Commerce and the Rubber Association of America. Every effort is being made to limit future production to these sizes.

The carrying capacity of solid tires is a subject that has been proposed heretofore for standardization, but progress was necessarily slow on account of the far-reaching effects of any action on the part of the Society. Both the Tire and Rim Division and the Truck Standards Division have been working on the subject for a considerable time, their efforts finally culminating in the adoption of tables printed on an adjoining page. Several years ago, the entire subject of carrying capacity of solid tires was voted down by the Society after having been brought before that body by the Standards Committee. Since that time, however, there have been continuous experiments by the rubber companies, with results that merit the support of the Society.

This movement has been given the closest attention by the manufacturers, who have aided in every way possible. It is understood that solid tires will not be guaranteed for replacement by manufacturers if the carrying capacities now adopted are exceeded by any user. These capacities are to be printed by the manufacturers in connection with price-lists.

In addition to the revised and new standards printed on the following pages, numerous recommendations for new standards were acted upon favorably by the Standards Committee early this month. These recommendations will be voted upon through the mails before they actually become S. A. E. standards or recommended practices.

Annular Ball Bearings

Separable (Open) Type

The accompanying tables show the standard ball bearings used in magnetos and other small machines.

Bearing Number	Bore		Diameter		Width of Individual Rings		Corner Radius	
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Mm.	Inches
5	5	0.19685	16	0.62992	5	0.19685	0.2	0.008
6	6	0.23622	21	0.82677	7	0.27559	0.3	0.012
7	7	0.27559	22	0.86614	7	0.27559	0.3	0.012
8	8	0.31496	24	0.94488	7	0.27559	0.3	0.012
9	9	0.35433	28	1.10236	8	0.31496	0.3	0.012
10	10	0.39370	28	1.10236	8	0.31496	0.3	0.012
11	11	0.43307	32	1.25984	7	0.27559	0.4	0.016
12	12	0.47244	32	1.25984	7	0.27559	0.4	0.016
13	13	0.51181	30	1.18110	7	0.27559	0.3	0.012
14	14	0.55118	35	1.37795	8	0.31496	0.5	0.020
15	15	0.59055	35	1.37795	8	0.31496	0.5	0.020
16	16	0.62992	38	1.49607	10	0.39370	1.0	0.040
17	17	0.66929	44	1.73229	11	0.43307	1.0	0.040
18	18	0.70866	40	1.57481	9	0.35433	1.0	0.040
19	19	0.74803	40	1.57481	9	0.35433	1.0	0.040

Annular Ball Bearings

Extra Small Series

Bearing Number	Bore		Diameter		Width of Individual Rings		Corner Radius	
	Mm.	Inches	Mm.	Inches	Mm.	Inches	Mm.	Inches
9430	4	0.15748	16	0.62992	5	0.19685	0.5	0.02
9431	5	0.19685	19	0.74803	6	0.23622	0.5	0.02
9432	6	0.23622	19	0.74803	6	0.23622	0.8	0.03
9433	7	0.27559	22	0.86614	7	0.27559	0.8	0.03
9434	8	0.31496	22	0.86614	7	0.27559	0.8	0.03
9435	9	0.35433	26	1.02363	8	0.31496	0.8	0.03

Annular Contact Ball Bearings

Ball bearings of the angular contact type are identical in sizes and boundary dimensions with S. A. E. Standard Annular Ball Bearings in the Light, Medium and Heavy Series.

ANNULAR BALL BEARINGS
Temperature for Measurements

The tolerances are applicable only when the bearings and measuring appliances have been brought to a uniform temperature, as for instance 68 deg. fahr. In case of question as to measurements, gages officially checked by the United States Bureau of Standards shall be considered as final. These tolerances are understood as referring to the dimensions of ball bearings, and not to the dimensions of measuring instruments. When it is desired to measure bearings by the use of maximum and minimum gages, the dimensions of the maximum gage shall be 0.0001 in. over the maximum bearing dimension, and the dimension of the minimum gage shall be 0.0001 in. under the minimum bearing dimension.

The above paragraph specifying the temperature at which tolerances are applicable to bearings and measuring appliances applies both to annular (radial) ball bearing tolerances and thrust bearing tolerances.

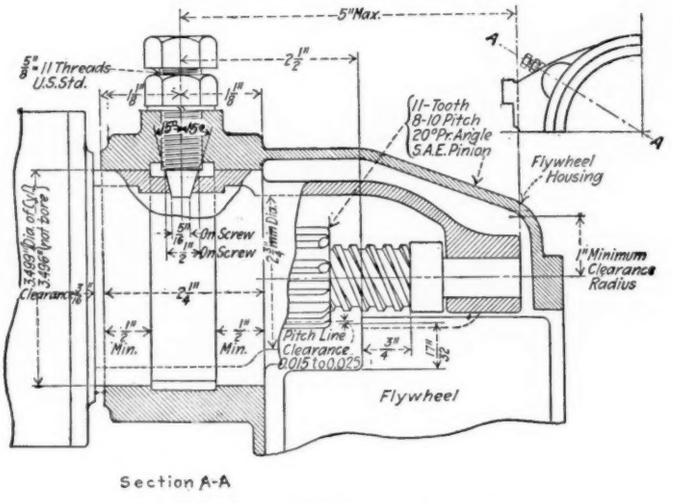
Definition of Eccentricity

The eccentricity of the inner race is that lack of running truth noticed upon the stationary outer race when rotating the inner race and balls upon true centers.

The eccentricity of the outer race is that lack of running truth shown upon a suitable indicator during the rotation of the outer race and balls upon the inner race fixed upon a stationary arbor.

Barrel Mounting for Starting Motors

For Outboard Mesh Installations Only



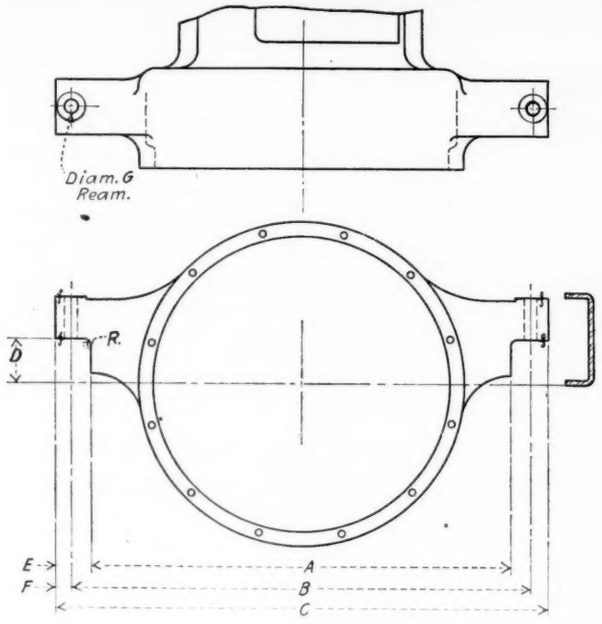
Section A-A

Nuts for Machine Screws

Size A		Short Diameter	Nominal Thickness
No.	Decimal		
0†	0.060	1/8	0.045
1†	0.073	5/32	0.055
2	0.086	3/16	0.065
3	0.099	7/32‡	0.074‡
4	0.112	1/4	0.084
5	0.125	9/32‡	0.094‡
6	0.138	5/16	0.104
*			
8	0.164	11/32	1/8
*			
10	0.190	3/8	9/64
12	0.216	7/16	5/32
14	0.242	1/2	3/16
*			
18	0.294	9/16	1/4
20	0.320	19/32	1/4
*			
24	0.372	11/16	5/16
*			
30	0.450	25/32	3/8

*Intermediate sizes are special— 7, 9, 16, 22, 26, 28
Their dimensions are the same as for— 6, 8, 14, 20, 24, 24
†Made from bar stock only.
‡Unless made from bar stock, Nos. 3 and 5 will be made the same dimensions as Nos. 2 and 4 respectively.
Table gives all stock sizes for square and hexagon machine screw nuts of brass, iron and steel.

Engine Support Arms—Truck



S. A. E. Flywheel Housing	A	B	C	D	E	F	G	R
No. 1	23½	26¾	28¾	2	2⅝	1	0.750	1/16
Nos. 2, 3 and 4	23⅛	24½	25¾	2½	1 1/16	5/8	0.625	5/8

Spark-Plug Shell—Aeronautic

Spark-Plug Thread Dimensions

Diameter	Maximum		Minimum	
	Mm.	Inch	Mm.	Inch
Outside (Full)	17.975	0.70768 (0.708)	17.850	0.70275 (0.703)
Pitch (Effective)	17.001	0.66933 (0.669)	16.876	0.66441 (0.664)
Root (Core)	15.864	0.62457 (0.625)	15.739	0.61964 (0.620)

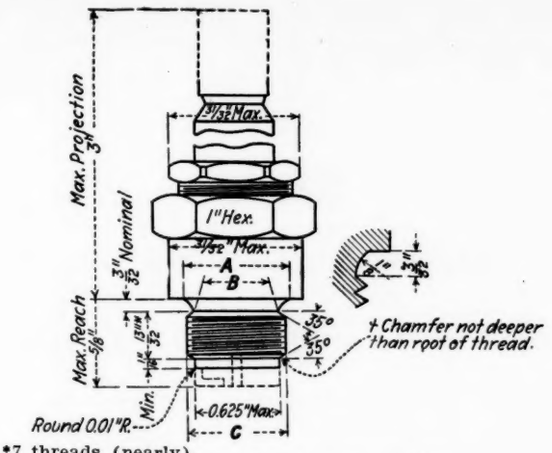
Tapped Hole Dimensions

Diameter	Maximum		Minimum	
	Mm.	Inch	Mm.	Inch
Outside (Full)	18.312	0.72095 (0.721)	18.187	0.71603 (0.716)
Pitch (Effective)	17.176	0.67622 (0.676)	17.051	0.67124 (0.671)
Root (Core)	16.201	0.63783 (0.638)	16.076	0.63291 (0.633)

Spark-Plug Shell—Aeronautic

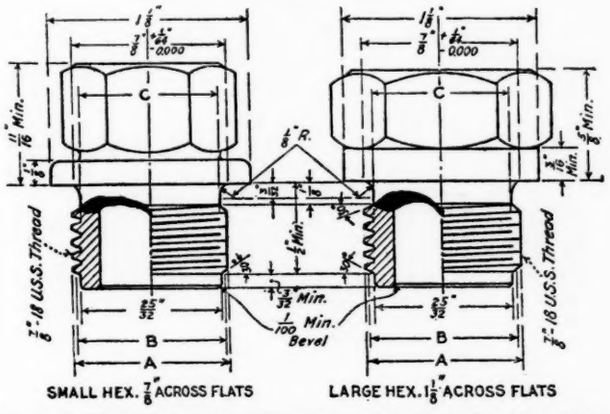
Thread 18 mm. 1½ mm. pitch.
Form of thread: International standard (same as U. S. standard, only ⅛ as much truncation at root of thread).

Dimension	Maximum		Minimum	
	Mm.	Inches	Mm.	Inches
A	18.50	0.728	18.00	0.709
B	.....	0.633†	.....	0.625
C	17.97	0.708	17.85	0.703



*7 threads (nearly).
†Not specified by Anglo-American Committee.

Spark-Plug Shells



All dimensions below the shoulder are identical for both sizes of spark-plug shells. The spark-plugs can be turned in by hand, using a wrench only for final tightening, if the taps are made to dimensions as follows:

Diameters	Nominal Dimension	Thread Limits	
		Spark-Plug	Tap
Outside (*A*)	0.875	0.872 Min. 0.875 Max.	0.877 Min. 0.879 Max.
Pitch (*B*)	0.839	0.836 Min. 0.839 Max.	0.841 Min. 0.843 Max.
Root (*C*)	0.803	0.800 Min. 0.803 Max.	0.805 Min. 0.807 Max.

The nominal tap-drill diameter is 13-16 or 0.8125 in.; the minimum diameter is 0.810 and the maximum 0.813 in.

Spark-Plug Terminal Threads

The standard thread for spark-plug terminals is No. 8-32 (0.164 in. dia.) A. S. M. E. standard thread.

Spark-Plug Shells

The dimensions of the hexagon for the 18 mm. diameter, 1½ mm. pitch spark-plug for motorcycle practice are the same as those for aeronautic recommended practice. The thread and tapped hole tolerances for motorcycle practice however are given in the following table:

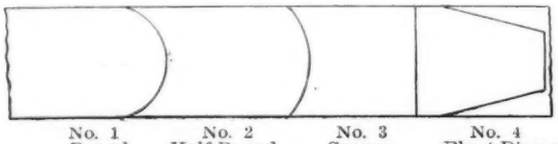
SPARK-PLUG THREAD DIMENSIONS

Diameter	Maximum		Minimum	
	Mm.	Inch	Mm.	Inch
Outside (Full)	.....	0.709	.....	0.706
Pitch (Effective)	.....	0.670	.....	0.667
Root (Core)	.....	0.626	.....	0.623

Spark-Plug Tapped Hole Dimensions

Diameter	Maximum		Minimum	
	Mm.	Inch	Mm.	Inch
Outside (Full)	.....	0.719	.....	0.717
Pitch (Effective)	.....	0.674	.....	0.672
Root (Core)	.....	0.636	.....	0.634

Leaf Point Nomenclature



No. 1 Round — No. 2 Half Round — No. 3 Square — No. 4 Blunt Diamond

From the Third Report of the Springs Division accepted by the Society January, 1913, and the Sixth Report adopted by the Society March, 1917. Revised April, 1919.

Leaf Points

The Leaf Points shown under "Leaf Point Nomenclature" are S. A. E. Recommended Practice as follows:

Leaf Points Nos. 1, 2, and 3 for rolled tapered leaves.
Leaf Points Nos. 3 and 4 for full thickness leaves.
Rebound clips to be used in all cases.

From the report of the Springs Division, adopted by the Society, April, 1919.

Finish of Springs

BLACK. All plates left in the condition in which they leave the heat-treating process.

HALF BRIGHT. Outside surface of the eyes and the upper exposed portion of the plates ground or polished free from scale and the remaining exposed surfaces left *black*.

BRIGHT. Outside surface of the eyes and the upper exposed portion of the plates and the edges of the plates ground or polished free from scale. Exposed surface on bottom left *black*.

Center-Bolts

	Spring Width, In.	Diameter Bolt	Diameter Head	Thickness Head
Passenger Cars	1¼, 1½, 1¾, 2	5/16	½	3/8
	2¼ and 2½	3/8	9/16	3/8
Commercial Vehicles	2	5/16	½	3/8
	2¼, 2½ and 3	3/8	9/16	3/8
	3½ and 4	7/16	5/8	½
	Over 4	½	¾	½

All dimensions in inches. All threads S. A. E. standard.

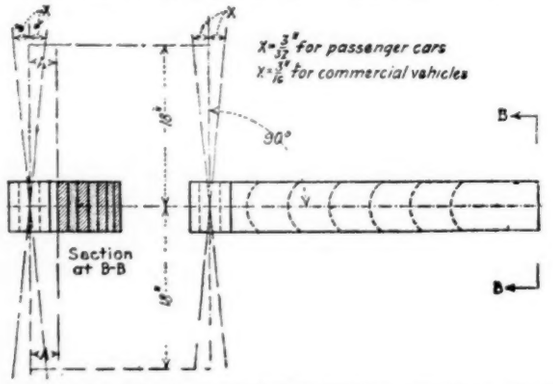
Where passenger car springs are of greater width than 2½ in. use center-bolts specified for commercial vehicle springs of similar width.

Center-Bolt Nuts

U. S. standard cold pressed blanks tapped with S. A. E. standard thread should be used for spring center-bolt hexagon nuts.

Tests for Parallelism

Eyes of main leaves to be parallel and square, within specified limits, to the main leaf and parallel to each other. The test to be made by inserting two 3-foot bars in the eyes as shown.



From the Fourth Report of the Springs Division adopted by the Society August, 1915. Revised April, 1919.

Eye Bushing and Bolt Tolerances

Part	Diameter Tolerance, In.	
Bushed eyes	+0.001	−0.003
Bolts for bushed eyes	−0.005	−0.008
Unbushed eyes	+0.001	−0.004
Ground bolts for unbushed eyes	−0.006	−0.009
Unground bolts (hot-rolled) for unbushed eyes	−0.006 Max., so as to use standard reamers	

Wrapped Eyes

Where drive is taken through springs on commercial vehicles, the second plate may be loosely wrapped around the eye at the driving end. In all other cases, wrapped eyes should not be used.

Width of Spring Ends

Spring ends should be finished to a width of 1/16 in. less than the nominal width of the springs, with a plus or minus tolerance of 0.005 in. for passenger cars and 0.010 in. for commercial vehicles, to a point far enough back on the spring to allow free shackle movement or free sliding movement in case of flat-end springs.

From the Fourth Report of the Springs Division adopted by the Society August, 1915. Revised April, 1919.

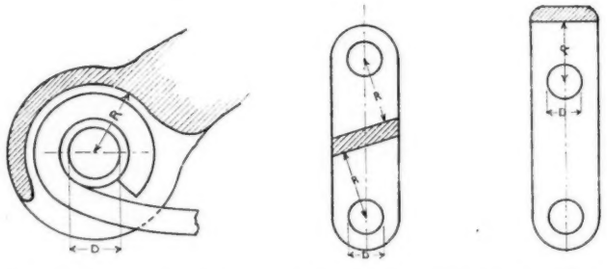
Frame Brackets

Frame brackets at the point of connection with spring eyes should provide sufficient clearance to allow the eye of the spring to work freely without the necessity of grinding the outer diameter of the spring eye or machining the inner radius of the hooded portion of the bracket.

The inner radius of the bracket hood should be determined by the following formula: one-half of bolt diameter plus ⅛ in. for bushing wall, plus ⅜ in. for maximum thickness of spring leaf, plus ⅛ in. for clearance. The formula would then read:

$$R = \frac{D}{2} + \frac{5}{8} \text{ in.}$$

where R = inner radius of hood.
D = diameter of shackle bolt.



The distance between the ears of bracket hoods should be 0.010 in. greater than the finished width of the spring eyes, with a minus tolerance of 0.000 in. and a plus tolerance of 0.005 in. The distance between the ears of bracket hoods should be 0.010 in. greater than the finished width of the spring eyes, with a minus tolerance of 0.000 in. and a plus tolerance of 0.005 in. for passenger cars. For commercial vehicles the minus tolerance should be 0.000 in. and the plus 0.010 in.

These recommendations also apply to the location of bars and the width between bosses where bar shackles are used.

Spring Widths and Lengths, Eye and Clip Diameters for Passenger Cars

Shipping Weight of Car, Lb.	Location	Approx. Load per Spring (With Passengers), Lb.	Recommended Spring Length, In.	Spring Width, In.	Eye Diameter (See Notes)	Spring Clip Diameter, In. (Alloy Steel)
Under 2500	Front	To be determined	38	1¾	5/8	½
	Rear		52	1¾ or 2	5/8	9/16
2500 to 3000	Front		40	1¾ or 2	5/8	9/16
	Rear		54	2	5/8	9/16
3000 to 3600	Front		40	2	5/8	5/8
	Rear		56	2 or 2¼	5/8	5/8
3600 to 4200	Front		42	2 or 2¼	3/4	5/8
	Rear		58	2¼ or 2½	3/4	11/16

Spring loads are for total loads with passengers and equipment. Where rear springs take drive or both drive and torque, add ⅛ in. to eye diameter on driving end. Where rear springs are used in cantilever form, the center trunnion pins should be of a diameter to equal one-half of spring width.

The table of width and spring clip diameters is formulated not from a standpoint of theory, but from what is at the present time accepted practice, both in this country and abroad. The widths given are those recommended by the various spring manufacturers for the loads specified.

Shackle bolt diameters should be formulated solely from the viewpoint of possibility of lubrication, keeping the pressures at approximately 400 lb. per square inch or lower under total loads. Because of small bearing surface the bolts in the shackles should be positively prevented from oscillating in the shackles.

The term "spring clip" shall be used to indicate the forging that fastens the spring to the axle. S. A. E. standard thread shall be used for the spring clip shank. The standard nut for spring clips should have S. A. E. hex nut dimensions, except that the height should be one and one-half times the diameter of the threaded portion of the clip.

Heat-treated steel spring clips shall be used in all cases.

Spring Widths and Lengths, Eye and Clip Diameters for Commercial Vehicles

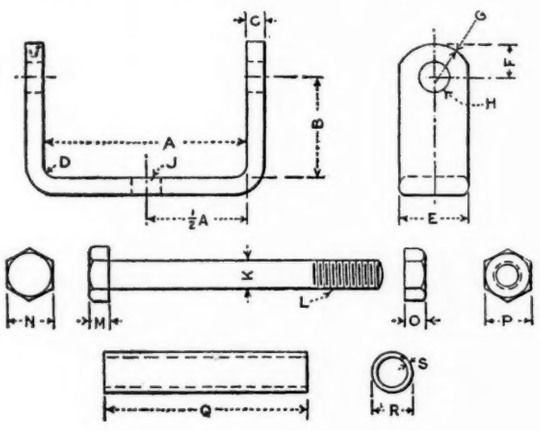
Capacity, Tons	Location	Approx. Load per Spring, Lb. (Truck Loaded)	Spring Width, In.	Min. Length of Spring, In.	Eye Diam. (See Notes)	Spring Clip Diam. (Alloy Steel)	
						Spring Set on Axle	Spring Underslung
¾	Front Rear	To be determined	2 or 2¼ 2 or 2¼	40 50	¾ ⅞	⅝ ⅝	¾ ¾
1	Front Rear		2 or 2¼ 2¼ or 2½	40 50	¾ 1	⅝ ¾	¾ ⅞
1½	Front Rear		2¼ or 2½ 2½ or 3	42 54	¾ 1	¾ ⅞	⅞ 1
2	Front Rear		2¼ or 2½ 3	42 54	¾ 1⅛	¾ ⅞	⅞ 1
3½	Front Rear		2½ or 3 3 or 4	44 56	⅞ 1¼	⅞ 1	1 1⅛
5	Front Rear		3 4 or 5	44 56	⅞ 1¼ or flat end	⅞ 1	1 1⅛
7	Front Rear		3 5	46 58	1 1¼ or flat end	1 1⅛	1⅛ 1¼

NOTES.—The column "Capacity, Tons," is intended only to indicate the general truck capacities on which the corresponding usual spring sizes are used. The above table applies to all types of drives.

Where rear springs are underslung, add ⅛ in. to clip diameter. In case the rear springs take drive or both drive and torque, the spring eye should be the same in diameter on the drive end as on the other end, and in agreement with the above table. Considering strength of the main plate, it is believed more desirable to put a heavier load on a bushing than to risk opening up the eye, which might happen if the eye were increased in diameter.

Heat-treated alloy steel spring clips shall be used in all cases.

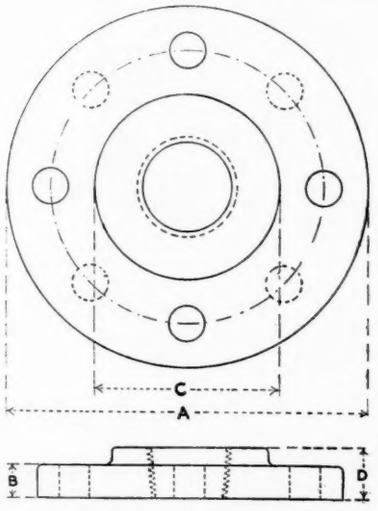
Rebound Clips, Spacers and Bolts



Dimensions	For Passenger Car Springs (Except Cantilevers or when wider than 2½ In.)	For Commercial Vehicle Springs (Also Cantilevers on Passenger Cars)	
		2¼, 2½, 3 In. Wide	3½ In. Wide and Over
A	*	*	*
B	†	†	†
C	3/16	1/4	1/4
D	1/8	3/16	3/16
E	3/4	1	1¼
F	3/8	1/2	5/8
G	7/16	5/8	3/4
H	13/32	13/32	15/32
I (dia. rivet)	5/16	3/8	3/8
J (omit with inverted clips)	11/32	13/32	13/32
K	5/16	3/8	7/16
L	5/16—18 U. S.	3/8—16 U. S.	7/16—14 U. S.
M	7/32	7/32	25/64
N	1/2	9/16	25/32
O	7/32	7/32	7/16
P	1/2	9/16	25/32
Q	**	**	**
R	7/16	1/2	5/8
S (B. W. G.)	Not less than 20 (0.035 in.)	18 to 20 (0.049 to 0.035 in.)	15 to 17 (0.072 to 0.058 in.)

*To be 1/32 to 1/16 in. greater than nominal width of spring.
†To be made to suit spring.
**To be 1/32 in. greater than nominal width of spring.
NOTE: Clearance between the rebound clip bolts (or spacer tubes if used) and spring plates shall not exceed 3/32 in. for passenger cars or 3/16 in. for commercial vehicles.

Round Pipe Flanges



Size of Pipe, In.	External Diameter, A	Thickness, B	Diameter of Hub, C (Approx.)	Length of Hub, D (Approx.)	Diameter of Bolt Circle	No. of Bolts	Size of Bolts
1	4	7/16	1 15/16	11/16	3	4	7/16
1¼	4½	½	2 5/16	¾	3⅜	4	7/16
1½	5	9/16	2⅝	⅞	3⅞	4	½
2	6	5/8	3⅛	1	4¾	4	5/8
2½	7	11/16	3⅝	1 1/16	5½	4	5/8
3	7½	¾	4 9/16	1⅛	6	4	5/8
3½	8½	13/16	4⅞	1 3/16	7	4	5/8
4	9	15/16	5⅜	1 5/16	7½	8	5/8
4½	9¼	15/16	5 13/16	1¼	7¾	8	¾
5	10	15/16	6 7/16	1 5/16	8½	8	¾
6	11	1	7 5/16	1 7/16	9½	8	¾

Bolt holes to be drilled ⅛ in. larger than bolts.
NOTE.—These dimensions conform to the American Standard 125-lb. pipe flanges.
Threads to be American Briggs Stondard taper pipe threads.

Revision of the Steel Standards

NICKEL CHROMIUM STEEL

To avoid confusion in correspondence, changes have been made in the specification numbers of some of the nickel chromium steels as follows: No. X 3315 is changed to 3415; X 3335 to 3435, and X 3350 to 3450.

CARBON STEELS

S. A. E. Specification No.	Carbon		Manganese		Phosphorus (Maximum)	Sulphur (Maximum)	Recommended Heat Treatment
	Minimum and Maximum	Desired	Minimum and Maximum	Desired			
1010	0.05 to 0.15	0.10	0.30 to 0.60	0.45	0.045	0.05	Quench at 1500° F.
1020	0.15 to 0.25	0.20	0.30 to 0.60	0.45	0.045	0.05	A or B
1025	0.20 to 0.30	0.25	0.50 to 0.80	0.65	0.045	0.05	H
1035	0.30 to 0.40	0.35	0.50 to 0.80	0.65	0.045	0.05	H, D or E
1045	0.40 to 0.50	0.45	0.50 to 0.80	0.65	0.045	0.05	H, D or E
1095	0.90 to 1.05	0.95	0.25 to 0.50	0.35	0.040	0.05	F

SILICO-MANGANESE STEELS

S. A. E. Specification No.	Carbon		Manganese		Phosphorus (Maximum)	Sulphur (Maximum)	Silicon		Recommended Heat Treatment
	Minimum and Maximum	Desired	Minimum and Maximum	Desired			Minimum and Maximum	Desired	
9250	0.45 to 0.55	0.50	0.60 to 0.80	0.70	0.045*	0.045	1.80 to 2.10	1.95	V
9260	0.55 to 0.65	0.60	0.50 to 0.70	0.60	0.045*	0.045	1.50 to 1.80	1.65	V

*Steel made by the acid process may contain maximum 0.05 phosphorus.

SCREW STOCK

S. A. E. Specification No.	Carbon	Manganese	Phosphorus	Sulphur
1112 (Bessemer)	0.08 to 0.16	0.60 to 0.80	0.09 to 0.13	0.075 to 0.15
1120 (Open Hearth)	0.15 to 0.25	0.60 to 0.90	0.06 maximum	0.075 to 0.15

These two steels are intended for general automatic screw-machine products not requiring more particular properties, and conform to specifications adopted by the American Society for Testing Materials.

CHROMIUM STEELS

Certain chromium steels have been eliminated as unnecessary and the list revised as shown. Chromium limits are given a wider range.

S. A. E. Specification No.	Carbon		Manganese		Phosphorus (Maximum)	Sulphur (Maximum)	Chromium		Recommended Heat Treatment
	Minimum and Maximum	Desired	Minimum and Maximum	Desired			Minimum and Maximum	Desired	
5120	0.15 to 0.25	0.20	*	*	0.04	0.045	0.60 to 0.90	0.75	B
5140	0.35 to 0.45	0.40	*	*	0.04	0.045	0.60 to 0.90	0.75	H or D
5165	0.60 to 0.70	0.65	*	*	0.04	0.045	0.60 to 0.90	0.75	H or D
52100	0.95 to 1.10	1.00	0.20 to 0.50	0.35	0.03	0.030	1.20 to 1.50	1.35	.....

*Two types of steel are available in this class, one with manganese 0.25% to 0.50% (0.35% desired), and silicon not over 0.20%; the other with manganese 0.60% to 0.80% (0.70% desired), and silicon 0.15% to 0.50%.

TUNGSTEN STEELS

S. A. E. Specification No.	Carbon		Manganese (Maximum)	Phosphorus (Maximum)	Sulphur (Maximum)	Chromium	Tungsten
	Minimum and Maximum	Desired					
7060	0.50 to 0.70	0.60	0.30	0.035	0.035	3.00 to 4.00	12.00 to 15.00
7160	0.50 to 0.70	0.60	0.30	0.035	0.035	3.00 to 4.00	15.00 to 18.00

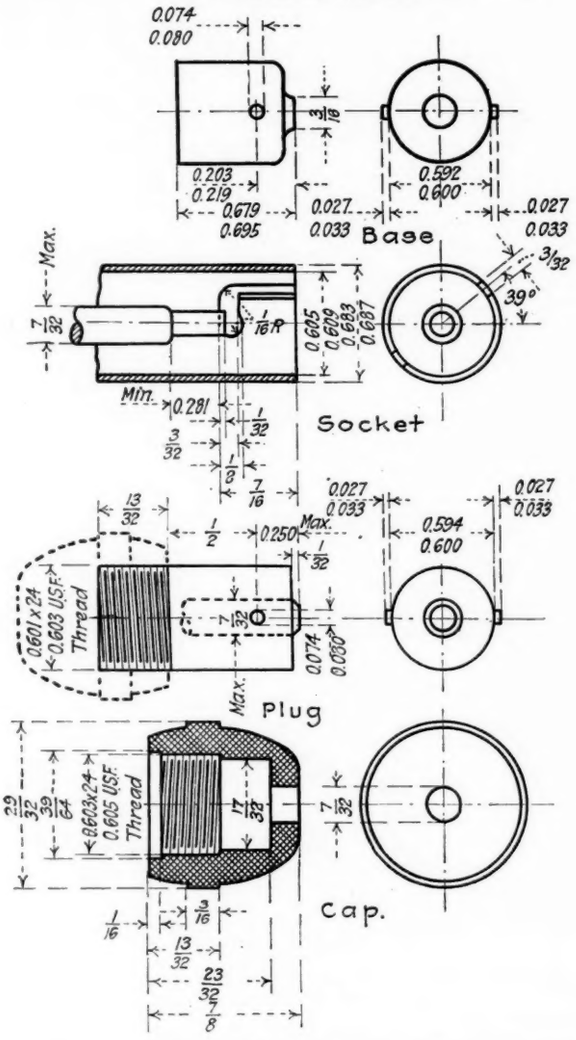
These specifications provide suitable high-tungsten steels for exhaust valves.

CHROMIUM VANADIUM STEELS

S. A. E. Specification No.	Carbon		Manganese		Phosphorus (Maximum)	Sulphur (Maximum)	Chromium		Vanadium		Recommended Heat Treatment
	Minimum and Maximum	Desired	Minimum and Maximum	Desired			Minimum and Maximum	Desired	Minimum	Desired	
6120	0.15 to 0.25	0.20	0.50 to 0.80	0.65	0.04	0.04	0.80 to 1.10	0.95	0.15	0.18	S
6125	0.20 to 0.30	0.25	0.50 to 0.80	0.65	0.04	0.04	0.80 to 1.10	0.95	0.15	0.18	S or T
6130	0.25 to 0.35	0.30	0.50 to 0.80	0.65	0.04	0.04	0.80 to 1.10	0.95	0.15	0.18	T or U
6135	0.30 to 0.40	0.35	0.50 to 0.80	0.65	0.04	0.04	0.80 to 1.10	0.95	0.15	0.18	T or U
6140	0.35 to 0.45	0.40	0.50 to 0.80	0.65	0.04	0.04	0.80 to 1.10	0.95	0.15	0.18	T or U
6145	0.40 to 0.50	0.45	0.50 to 0.80	0.65	0.04	0.04	0.80 to 1.10	0.95	0.15	0.18	U
6150	0.45 to 0.55	0.50	0.50 to 0.80	0.65	0.04	0.04	0.80 to 1.10	0.95	0.15	0.18	U
6195	0.90 to 1.05	0.95	0.20 to 0.45	0.35	0.03	0.03	0.80 to 1.10	0.95	0.15	0.18	U

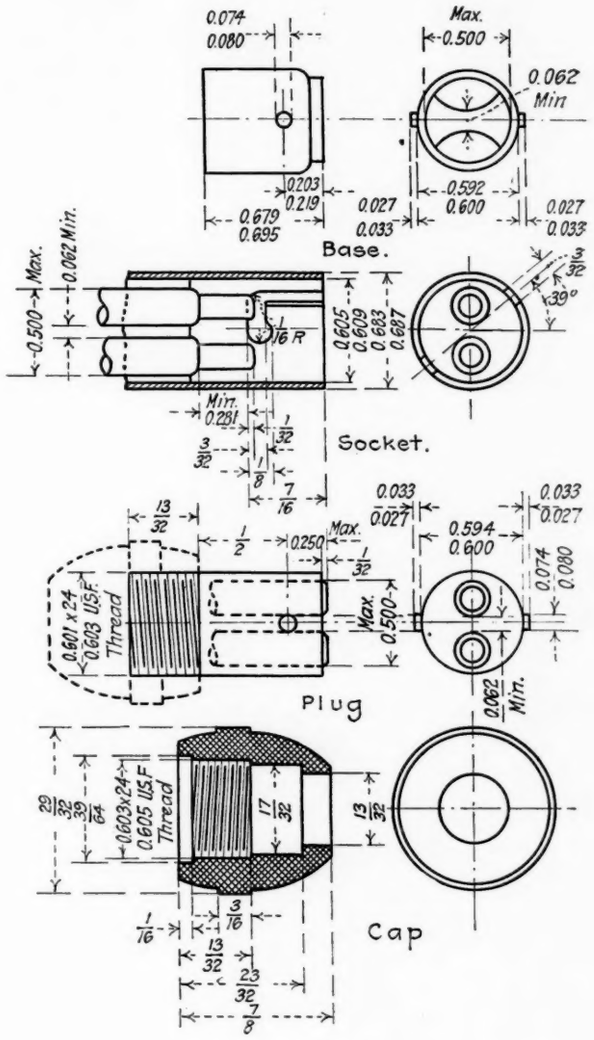
Bases, Sockets and Connectors for Ground-Return Systems

These Dimensions Have Been Revised and Now Conform to the S. A. E. Standard Practice

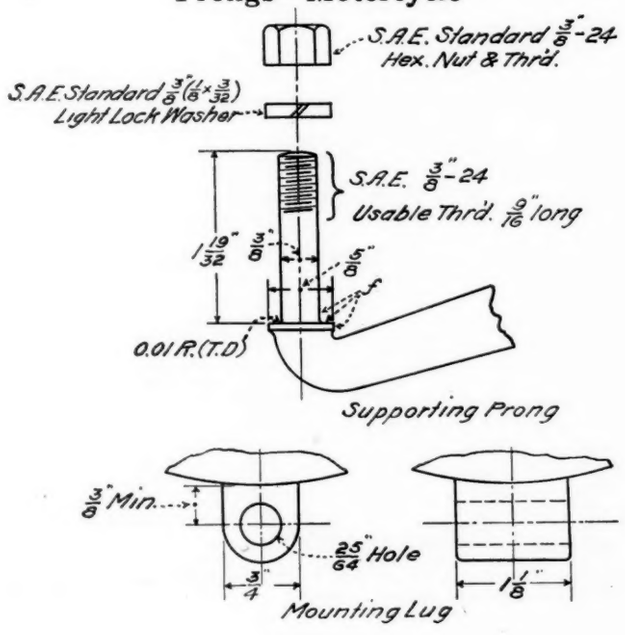


Bases, Sockets and Connectors for Insulated-Return Systems

These Dimensions Have Been Revised and Now Conform to the S. A. E. Standard Practice



Head-Lamp Mounting Lugs and Supporting Prongs—Motorcycle



Head-Lamp Lens Sizes

Outside Diameter of Lens	Diameter of Prism Area
$8\frac{5}{32} \pm \frac{1}{32}$	$6\frac{7}{8} \pm \frac{1}{32}$
$8\frac{1}{2} \pm \frac{1}{32}$	$7\frac{1}{4} \pm \frac{1}{32}$
$9 \pm \frac{1}{32}$	$7\frac{3}{4} \pm \frac{1}{32}$
$9\frac{1}{2} \pm \frac{1}{32}$	$8\frac{1}{4} \pm \frac{1}{32}$

Thickness of bevel edge for all sizes is to be ⅛ in., plus 1/32, minus 0. This is commonly known as double thick American glass.

This standard applies to automobile electric head-lamps only and is intended to become fully operative by July 1, 1921.

Focusing Length of Incandescent Lamps

The standard* focal length for all electric incandescent lamps used in head-lamps for either electric or gasoline propelled vehicles shall be $1\frac{1}{4} \pm \frac{3}{32}$ in. as measured from the center of the filament field to a plane tangent to the nearer or locating side of the lock pins in the base.

The longitudinal axis of the lamp filament at the focal point shall not deviate more than $\frac{5}{64}$ in. from the axis of the lamp base.

It is recommended that these deviations be reduced by the incandescent lamp manufacturers so that the allowable deviations of the filament field from the axis of the base is no greater than one-half of the base of the filament field for any type of incandescent lamp.

*Electric incandescent lamp manufacturers measure the focal length (light center length) from the open end of the base to the center of the filament field. This distance is $1\frac{13}{16}$ in. and corresponds to the S. A. E. focal length of $1\frac{1}{4}$ in. from the locating side of the pins to the center of the filament field.

Cable Terminals for Generators, Switches and Meters

Spade Type

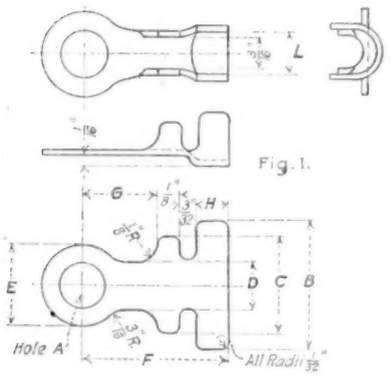


Fig. 1.

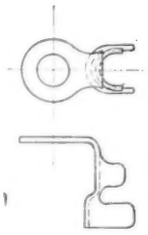


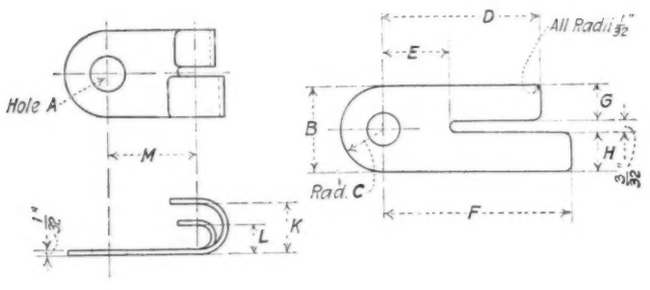
Fig. 2.

Terminal Stud Sizes	Dia. of Hole	B	C	D	E	F	G	H	L	Thick.
No. 8 (0.1640)	0.1710	11/16	15/32	7/32	3/8	3/4	3/8	5/32	7/32	0.031
No. 10 (0.1900)	0.2010									
No. 14 (0.2420)	0.2570	23/32	17/32	1/4	15/32	13/16	13/32	3/16	1/4	0.040

Material: To be specified by user.
NOTE.—The terminals as formed in Fig. 1 may also be formed as shown in Fig. 2. These terminals are not intended for use on ignition distributors.

Cable Terminals for Generators, Switches and Meters

Side Type



Terminal Stud Sizes	Dia. of Hole	B	Rad. C	D	E	F	G	H	K	L	M
No. 8 (0.1640)	0.1710	3/8	3/16	19/32	5/16	3/4	1/8	5/32	5/32	5/64	11/32
No. 8 (0.1640)	0.1710	13/32	13/64	43/64	5/16	27/32	1/8	3/16	3/16	3/32	3/8
No. 10 (0.1900)	0.2010										
No. 14 (0.2420)	0.2570	1/2	1/4	27/32	3/8	1 3/32	3/16	7/32	1/4	1/8	1/2

Material: To be specified by user.
NOTE.—These terminals are not intended for use on ignition distributors.

Flexible Metal Tubing

*Outside Diameter, In.	Sizes Vary by
3/4 to and including 1 1/2	1/16 in.
1 5/8 to and including 2 1/2	1/8 in.
2 3/4 to and including 4	1/4 in.

*As received from the tubing manufacturers, and not twisted tightly or loosely.

Carrying Capacities and Inflation Pressures of Automobile Pneumatic Tires

Tire Size	Fabric Tires for Passenger Cars		Cord Tires for Passenger Cars		Cord Tires for Commercial Vehicles	
	Maximum Load per Tire, Lb.	Air Pressure, Lb. per Sq. In.	Maximum Load per Tire, Lb.	Air Pressure, Lb. per Sq. In.	Maximum Load per Tire, Lb.	Air Pressure, Lb. per Sq. In.
3	375	45	400	40	....	....
3 1/2	570	55	600	50	....	....
4	815	65	850	60	850	70
4 1/2	1100	75	1200	70	1200	75
5	1500	85	1700	80	1700	80
6	....	....	....	....	2200	90
7	....	....	....	....	3000	100
8	....	....	....	....	4000	110
*9	....	....	....	....	5000	120
*10	....	....	....	....	6000	130

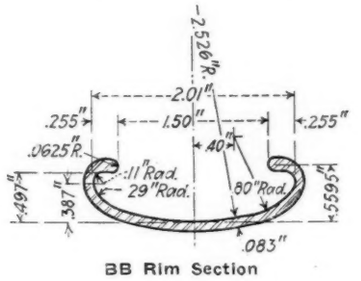
*The loads and pressures for these sizes are S. A. E. Recommended Practice only.

Chains—Motorcycle

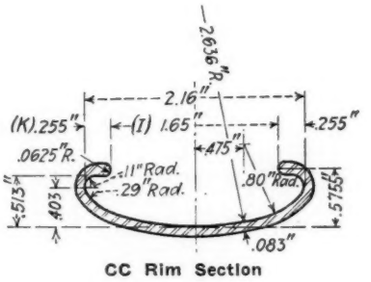
Motorcycle driving chains shall be of the roller type with the following dimensions:

Pitch, 5/8 in.
Roller width, 3/8 in.
Roller diameter, 0.40 in.

Motorcycle Rim Sections

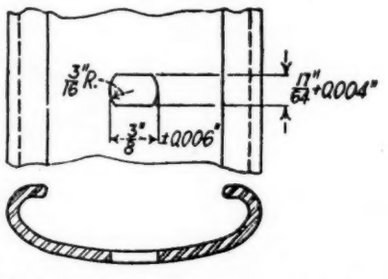


BB Rim Section



CC Rim Section

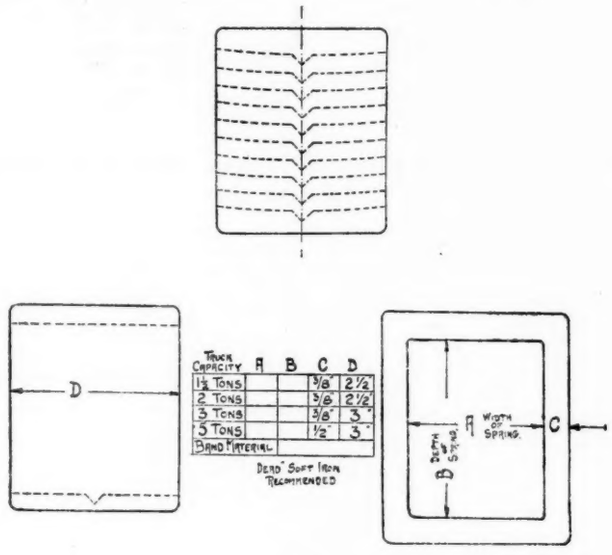
Valve-Hole Size—Motorcycle Rim



The valve-hole is located in the center of the rim and midway between two adjacent spoke holes.

Shrunk Center-Bands for Commercial Vehicle Springs

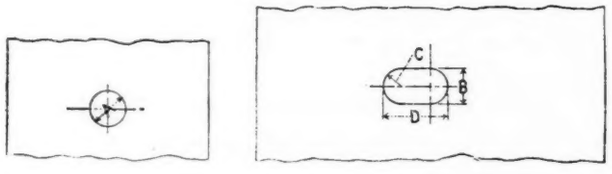
The accompanying dimensions of shrunk center-bands have been used in some instances and are given for the information of those interested.



Nibs

Nibs are ⅜ in. diameter, ¾ in. center to center where two are used.

Valve-Hole Size—Automobile Rims



Rim Size	Valve Hole Diameter (A)
3½	⅝
4	⅝
4½	⅝

All dimensions are in inches.

Rim Size	*Valve Hole		
	B	C	D
6	⅝	5/16	1⅛
7	⅝	5/16	1½
8	To be determined		

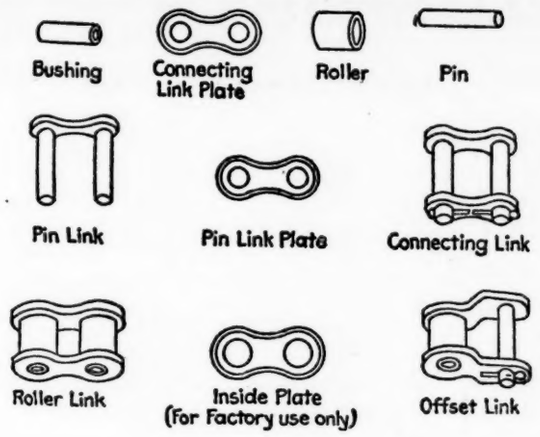
*Valve-holes for Giant Demountable and Straight Side Rims.

Carrying Capacities and Inflation Pressures of Motorcycle Tires

Tire Size		Maximum Load		Corresponding Inflation Pressure	
In.	Mm.	Lb. per Tire	Kg. per Tire	Lb. per Sq. In.	Kg. per Sq. Cm.
2¼	60	175	79.5	35	2.46
3	75	325	147.5	40	2.81
3½	90	400	181.4	45	3.16

NOTE.—These values are in accordance with the recommendations adopted by the Tire and Rim Association and the War Service Committee of the Rubber Industry of the United States.

Nomenclature of Roller-Chain Parts

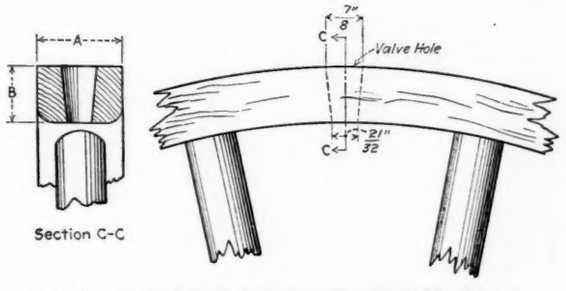


Roller-Chain Dimensions

Manufacturer's Standard Number	Pitch	*Chain Width	Roller Diameter
2	½	¼	.306
2½	⅝	⅜	.400
3	¾	½	15/32
4	1	⅝	⅝
5	1¼	¾	¾
6	1½	1	⅞
7	1¾	1	1
8	2	1¼	1⅛
10	2½	1½	1 9/16

Dimensions are in inches.
*Distance between the inside plates.

Wood Felloe Dimensions for Pneumatic Tire Rims



Valve Hole Dimensions for Demountable Rims

Wood Felloe Dimensions

Nominal Tire and Rim Size	Width (A)	Depth (B)
30x3½	1½	1¼+1/16, −0
32x3½	1½	1¼+1/16, −0
32x4	1¾	1¼+1/16, −0
33x4	1¾	1¼+1/16, −0
32x4½	2⅛	1¼+1/16, −0
34x4½	2⅛	1¼+1/16, −0
36x6	3¼	1⅝±1/16
38x7	3 29/32	1⅝±1/16
40x8	4¼	1⅝±1/16
44x10	5¼	1⅝±1/16

Dimensions in inches.
NOTE.—The above values correspond to those adopted by the Automotive Wood Wheel Manufacturers Association.

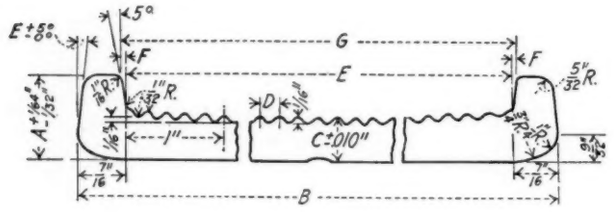
Detachable and Plain Clincher Rims

Valve holes in wood felloe for detachable and plain clincher rims to be same diameter as valve hole in steel rim.

Base Bands for Industrial Truck Tires

The S. A. E. Standard 3½ and 5-in. Base Bands for Solid Tires are also standard for Industrial Truck Tires.

BASE BANDS FOR SOLID TIRES



Base Band Size	A	B	Limits of B	C	*Corrugations No.	*Corrugations D	E	G	F
3	23/32	3¾	±1/32	5/16	16	0.181	2 29/32	3 1/16	5/64
3½	¾	4¼	±1/32	11/32	18	0.191	3 3/16	3 9/16	1/16
4	23/32	4 13/16	±1/32	⅜	20	0.196	3 59/64	4 1/16	9/128
5	27/32	5⅜	±1/32	7/16	26	0.189	4 59/64	5 1/16	9/128
6	27/32	6⅜	±1/32	7/16	32	0.185	5 59/64	6 1/16	9/128
7	27/32	7⅜	±1/32	7/16	36	0.192	6 59/64	7 1/16	9/128
8	⅞	8⅜	±3/64	7/16	40	0.196	7 27/32	8	5/64
10	⅞	10⅜	±3/64	7/16	50	0.196	9 27/32	10	5/64
12	⅞	12⅜	±3/64	7/16	60	0.197	11 27/32	12	5/64
14	⅞	14⅜	±3/64	7/16	70	0.197	13 27/32	14	5/64

NOTE.—The above values correspond to those adopted by the War Service Committee of the Rubber Industry of the U. S. A.
*Either mill corrugated or dovetail facings may be used.

Solid Tire Sizes

In.	Mm.	In.	Mm.
32x3	75/660	36x6	150/762
32x3½	90/660	40x6	150/864
34x3½	90/711	36x7	175/762
36x3½	90/762	40x7	175/864
32x4	100/660	36x8	200/762
34x4	100/711	36x10	250/762
36x4	100/762	40x10	250/864
34x5	125/711	40x12	300/864
36x5	125/762	40x14	350/864
40x5	125/864		

These sizes conform to those adopted by the National Automobile Chamber of Commerce.

Carrying Capacity of Solid Tires

Solid Tire Width	Up to and Including 36 In. Diameter	40 In. Diameter
3	1000	.....
3½	1300	.....
4	1700	.....
5	2500	2,600
6	3300	3,500
7	4200	4,500
8	5200	5,600
10	7000	7,500
12	....	9,500
14	....	11,500

Application of Solid Tires

Single Wheels		Dual Wheels
32x3	36x4	(Dual) (Single)
32x3½	34x5	36x4 or 36x 8
34x3½	36x5	36x5 or 36x10
36x3½	36x6	40x5 or 40x10
32x4	36x7	40x6 or 40x12
34x4		40x7 or 40x14

Section Dimensions of Single and Dual Solid Tire Wheels

	Nominal Tire Widths In.	Nominal Tire Widths Mm.	Width of Felloe and Band In.	Width of Felloe and Band Mm.	Thickness of Steel Band In.	Thickness of Steel Band Mm.	*Felloe Thickness In.	*Felloe Thickness Mm.
Single wheels	3	75	2¼	57	¼	6.35	1½	38
	3½	90	2¾	70	5/16	7.93	1½	38
	4	100	3¼	83	5/16	7.93	1⅝	41
	5	125	4¼	108	⅜	9.52	2	51
	6	150	5¼	133	⅜	9.52	2	51
	7	175	6¼	159	⅜	9.52	2	51
Giant ▼ singles for dual wheels	8	200	8	203	⅜	9.52	2	51
	10	250	10	254	⅜	9.52	2	51
	12	300	12	305	⅜	9.52	2	51
	14	350	14	356	⅜	9.52	2	51
Dual wheels	4	100	8	203	⅜	9.52	2	51
	5	125	10	254	⅜	9.52	2	51
	6	150	12	305	⅜	9.52	2	51
	7	175	14	356	⅜	9.52	2	51

*Tolerances for felloe thicknesses are ±1/16 in.

Allowable Tolerances in Felloe Bands

	Plus In.	Plus Mm.	Minus In.	Minus Mm.
Band circumference before application.	0	0	1/16	1.69
Band circumference after application to wood wheels and circumferences of steel wheels	1/16	1.59	1/32	0.79
Width of band	1/32	0.79	1/32	0.79
Thickness of band	0.006	0.15	0.006	0.15
Radius of band after application	1/16	1.59	1/16	1.59

Circumferential deviation from precise figure must be uniform across entire width of band.
Radial deviations must not occur at diametrically opposite points, and there must be no flat spots or kinks in band on finished wheel. Either side of band when laid on a surface plate must not clear more than 1/32 in. at any point.

Solid Tire and Wheel Diameters, Wheel Circumferences

Nominal Outer Diameter of Tires In.	Nominal Outer Diameter of Tires Mm.	Actual Diameter Over Steel Band In.	Actual Diameter Over Steel Band Mm.	*Actual Circumference Over Steel Band In.	*Actual Circumference Over Steel Band Mm.
32	810	26	660.4	81 1/16	2074.9
34	860	28	711.2	87 3/32	2234.4
36	910	30	762.0	94¼	2393.9
40	1010	34	863.6	106 13/16	2713.0

Pneumatic Tires and Rims for Passenger Cars and Commercial Vehicles

It is recommended that pneumatic tires on passenger cars and commercial vehicles shall be of the straight-side type in all except 30x3½ regular and 31x4-in. oversize, where only regular clincher type should be used.

Nominal Tire and Rim Sizes		Oversize Tire		Tire-Seat Dia. (Rim)		Type of Rim
In.	Mm.	In.	Mm.	In.	Mm.	
30x3½	90/585	31x4	105/585	23	585	Clincher
32x3½	90/635	33x4	105/635	25	635	Straight Side
32x4	105/610	33x4½	120/610	24	610	Straight Side
33x4	105/635	34x4½	120/635	25	635	Straight Side
32x4½	120/585	33x5	135/585	23	585	Straight Side
34x4½	120/635	35x5	135/635	25	635	Straight Side
36x6	150/610	38x7	175/610	24	610	Straight Side
38x7	175/610	40x8	200/610	24	610	Straight Side
40x8	200/610	.....	.....	24	610	Straight Side

These tire and rim sizes conform to the joint recommendation of the N.A.C.C. and the Rubber Association of America, which contemplates that they will be the only sizes used by automobile manufacturers in the future.

Inch Nomenclature

In inch nomenclature, nominal tire diameter = tire-seat diameter + twice tire cross-section diameter. Sizes are designated by giving outside diameter of tire and tire-section diameter, as (30x3½).

Metric Nomenclature

In metric nomenclature, the nominal diameter = tire-seat diameter. Sizes are designated by giving tire cross-section diameter and tire-seat diameter. When spoken, the size is referred to as "90 for 585"; but is branded as 90/585.

Sizes for Original Equipment

It is recommended that manufacturers use as original equipment the nominal tire and rim sizes, thus permitting the use of the oversize equipment given.

Rims, Cleats and Lugs for Tractor Wheels

Tractor Front Wheels

Type	Wheel Diameter, In.	Width of Face, In.	Rim Thickness, In.
Plain flat plate rims..	28	5 or 6	⅜
	32	5 or 6	⅜
	36	5 or 6	⅜
	42	5 or 6	⅜
	46	4, 5 or 6	⅜
Flanged rims.....	28	5	5/16
	32	5	5/16
	36	5	5/16
	42	5	5/16
	46	4 or 5	5/16

Stock from which flanged tires are made to be 1 in. wider than the face of the finished tire.

Tractor Rear Wheels

Wheel Diameter, In.	Rim Thickness, In.
42	8 or 10
48	10 or 12
54	10 or 12
60	10 or 12

Diameter of holes for lugs and cleats..... 11/16 in.
Diameter of bolts for locking cleats..... ⅝ in.

Solid Tire Sections

Solid Tire Width, In.	*Total Sectional Area of Rubber, Sq. In.
3	To be determined
3½	6.75
4	7.75
5	10.75
6	13.75
7	16.75
8	19.75
10	25.75
12	31.75
14	37.75

*Includes both hard and soft rubber.
NOTE.—The above values correspond to those adopted by the Solid Tire Division, War Service Committee of the Rubber Industry of the U. S. A.

Industrial Truck Tires

Tire Dimensions		Wheel Dimensions	
Nominal Diameter, In.	Sectional Width, In.	Wheel Diameter, In.	Felloe Width, In.
10	3½	6	2¾
10	5	6	4¼
16	3½	12	2¾
16	5	12	4¼
20	3½	16	2¾
20	5	16	4¼
24	3½	20	2¾
28	3½	24	2¾

NOTES:—Wheel diameters shall be 4 in. less than the nominal tire diameters.
The height of the finished tire is to be 2 in. for all sizes.
The width of the wheel felloe is to be in accordance with the present S. A. E. standard truck tire practice and the rim diameter tolerances will be plus 0.005, minus zero.

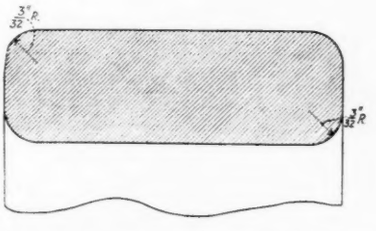
Bolt Equipment for Solid Tire Side Flanges

Nominal Outside Tire Diameter, In.	Diameter Bolt Hole Circle		Number of Bolts
	In.	Mm.	
*30	22½	571.5	6, 9, or 18
32	24½	622.3	8, 12, or 24
34	26½	673.1	8, 12, or 24
36	28½	723.9	8, 12, or 24
*38	30½	774.7	10, 15, or 30
40	32½	825.5	10, 15, or 30
*42	34½	876.3	10, 15, or 30

All bolts to be ½ in. (12.7 mm.) diameter.
*These sizes are not S. A. E. Standard solid tire sizes.

Edges of Felloe Bands

Edges of felloe bands shall be rounded on all edges with radius not to exceed 3/32 in. (2.38 mm.).

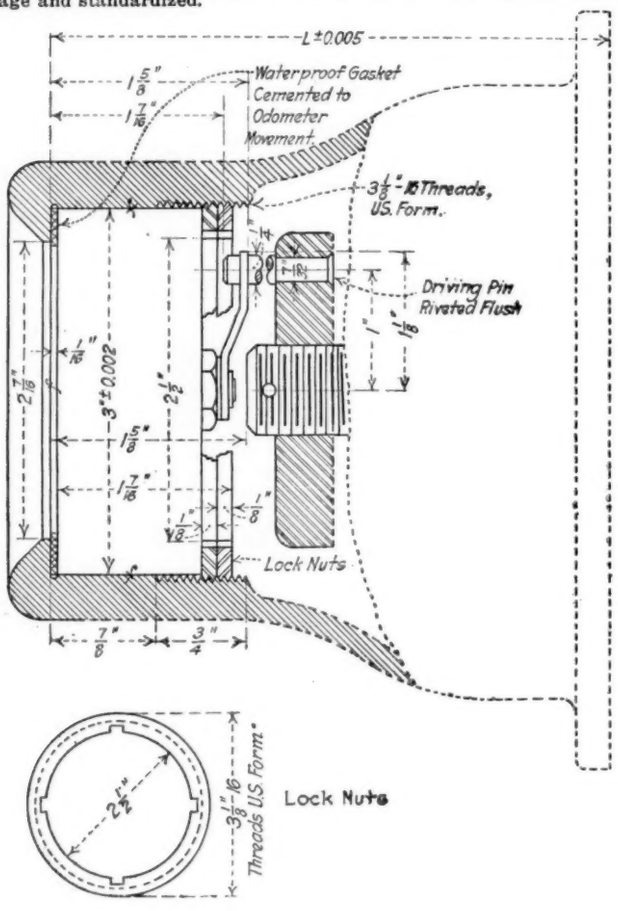


In measuring circumference of band, if there is not an allowance on the tapeline itself, a correction amounting to three times the thickness of the tapeline should be made.

Note.—All of the foregoing, so far as pertinent, applies to metal wheels.

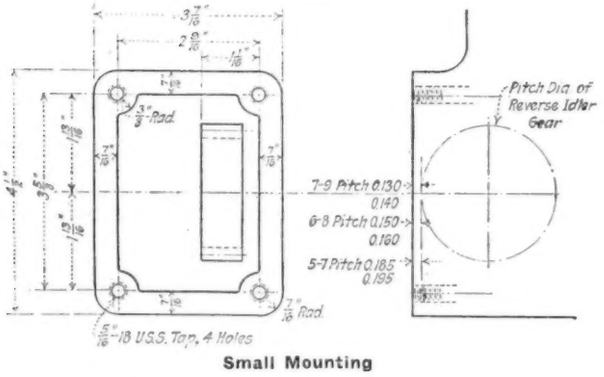
Hub Odometers for Commercial Vehicles

An outgrowth of the war, this mechanism has been sanctioned by usage and standardized.

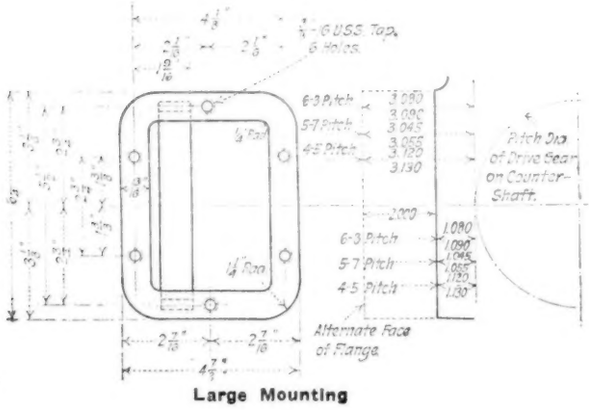


Tire-Pump Mounting

Transmission Type

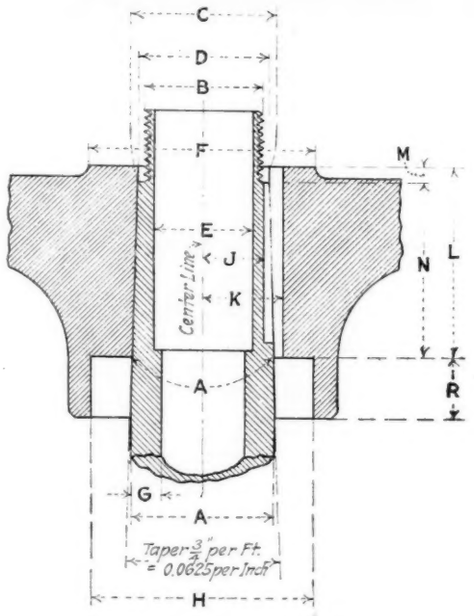


Small Mounting



Large Mounting

Steering-Wheel Hubs



All Threads U. S. Form

	6	7	8	9	11
A	⅞	1	1⅛	1¼	1½
A[1]	0.870	0.994	1.118	1.242	1.490
†B	¾–20	⅞–20	1–20	1⅛–18	1¼–18
C	0.8075	0.9217	1.0360	1.1502	1.3767
H	1 9/16	1 13/16	1 13/16	2 1/16	2 5/16
F	1½	1¾	2	2¼	2⅝
L	1⅛	1 5/16	1 15/32	1⅜	2
M	⅛	5/32	5/32	5/32	5/16
N	1	1 5/32	1 5/16	1 13/32	1 13/16
R	⅜	7/16	½	9/16	⅝
D	0.7997	0.9120	1.0262	1.1404	1.3650
E	19/32	23/32	51/64	59/64	1 3/64
G	5/32	5/32	3/16	3/16	¼
*J	0.3569	0.4164	0.4552	0.5147	0.6333
*K	0.5444	0.6039	0.7052	0.7647	0.8833
*Key width	0.1875	0.1875	0.2500	0.2500	0.2500

*S. A. C. Recommended Practice.
†S. A. E Standard Fine.

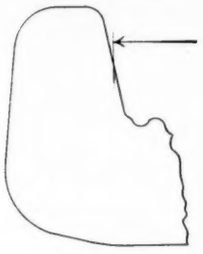
Steering-Wheel Hubs

***Steering-Wheel Nut and Seat Dimensions**

Steering Wheel No.	Thread, S. A. E. Fine	Nut Dimensions			
		Wall	Short Diameter	Long Diameter	F
6	¾—20	5/32 ¼	1 1/16 1¼	1 15/64 1 7/16	1½
7	⅞—20	3/16 ¼	1¼ 1⅜	1 7/16 1 19/32	1¾
8	1 —20	3/16 7/32	1⅜ 1 7/16	1 19/32 1 21/32	2
9	1⅛—18	3/16 ¼	1½ 1⅝	1 47/64 1⅞	2¼
11	1½—18	3/16 9/32	1⅝ 1 13/16	1⅞ 2 3/32	2⅜

All dimensions in inches.
*Published as general information only.

Measuring of Solid Tire Widths

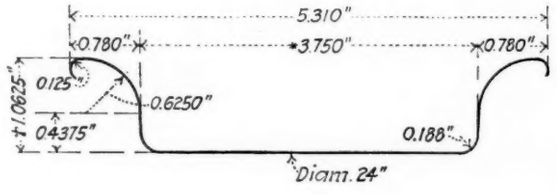


The standard width of solid tires shall be the "nominal" width in inches as measured inside the channel (see accompanying sketch) at the mean of the vertical seat of the rubber, the tolerances being plus or minus 1/16 in.

Recommendations for Standards Adopted by the Standardization Committee at Winter Meeting in New York.

RIM SECTION ADDED

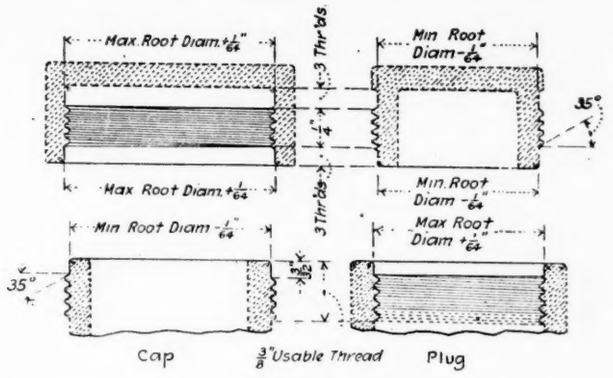
As the S. A. E. standards do not include a 5-in. rim section, the Society adopted a section in accordance with the accompanying diagram.



FIVE-INCH PNEUMATIC TIRE SECTION

Nominal tire and rim size: 34 x 5 in.
Type of rim: straight-side.
Rim diameter: 24 in.
Rim circumference: 75.398 ± 0.047 in.
*Tolerances: plus or minus 0.047 in.
†Tolerances: plus 0.031 in., minus 0.000.

Tank and Radiator Caps



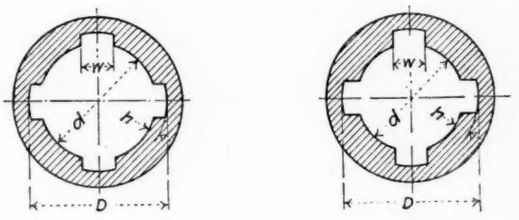
Dimensions for Radiator and Fuel Tank Caps

Diameter	Pitch	Diameter	Pitch	Diameter	Pitch	Diameter	Pitch
1	20	1½	18	2¼	16	3	16
1⅛	18	1¾	16	2½	16	3½	16
1¼	18	2	16	2¾	16	4	16
1⅜	18						

Recess on neck is optional.
The 35 deg. angle in the upper right-hand figure refers to the chamfer.
Corner radii are 1/32.
All threads are S. A. E. Fine.

A counterbore of 3 threads is specified for the cap in order to allow sufficient clearance for tapping.

Four-Spline Fittings



4A
w = 0.241D
h = 0.075D
d = 0.850D

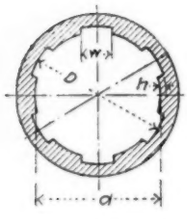
4B
w = 0.241D
h = 0.125D
d = 0.075D

DIMENSIONS FOR 4-SPLINE SHAFT FITTINGS

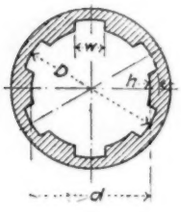
	4A—PERMANENT FIT									4B—TO SLIDE WHEN NOT UNDER LOAD									
Nom Diam	D		d		w		h		T[1]	Nom Diam	D		d		w		h		T[1]
	max	min	max	min	max	min	max	min			max	min	max	min	max	min	max	min	
¾	0.750	0.749	0.637	0.636	0.181	0.179	0.056	0.055	78	¾	0.750	0.749	0.562	0.561	0.181	0.179	0.094	0.093	123
⅞	0.875	0.874	0.744	0.743	0.211	0.209	0.066	0.065	107	⅞	0.875	0.874	0.656	0.655	0.211	0.209	0.109	0.108	167
1	1.000	0.999	0.850	0.849	0.241	0.239	0.075	0.074	139	1	1.000	0.999	0.750	0.749	0.241	0.239	0.125	0.124	219
1⅛	1.125	1.124	0.956	0.955	0.271	0.269	0.084	0.083	175	1⅛	1.125	1.124	0.844	0.843	0.271	0.269	0.141	0.140	277
1¼	1.250	1.249	1.062	1.061	0.301	0.299	0.094	0.093	217	1¼	1.250	1.249	0.937	0.936	0.301	0.299	0.156	0.155	341
1⅜	1.375	1.374	1.169	1.168	0.331	0.329	0.103	0.102	262	1⅜	1.375	1.374	1.031	1.030	0.331	0.329	0.172	0.171	414
1½	1.500	1.499	1.275	1.274	0.361	0.359	0.112	0.111	311	1½	1.500	1.499	1.125	1.124	0.361	0.359	0.187	0.186	491
1⅝	1.625	1.624	1.381	1.380	0.391	0.389	0.122	0.121	367	1⅝	1.625	1.624	1.219	1.218	0.391	0.389	0.203	0.202	577
1¾	1.750	1.749	1.487	1.486	0.422	0.420	0.131	0.130	424	1¾	1.750	1.749	1.312	1.311	0.422	0.420	0.219	0.218	670
2	2.000	1.998	1.700	1.698	0.482	0.479	0.150	0.148	555	2	2.000	1.998	1.500	1.498	0.482	0.479	0.250	0.248	875
2¼	2.250	2.248	1.912	1.910	0.542	0.539	0.169	0.167	703	2¼	2.250	2.248	1.687	1.685	0.542	0.539	0.281	0.279	1106
2½	2.500	2.498	2.125	2.123	0.602	0.599	0.187	0.185	865	2½	2.500	2.498	1.875	1.873	0.602	0.599	0.312	0.310	1365
3	3.000	2.998	2.550	2.548	0.723	0.720	0.225	0.223	1249	3	3.000	2.998	2.250	2.248	0.723	0.720	0.375	0.373	1969

Dimensions in inches.
Radii on edges of splines not to exceed 0.015 in.
Splines shall not be more than 0.006 in. per ft. out of parallel with respect to the axis of the shaft.
[1]Torque = 1000x4x mean Rxhx1 = pound-inches torque capacity per inch of bearing length at 1000 lb. pressure per sq. in. on sides of splines. No allowance is made for radii on edges or for clearances.

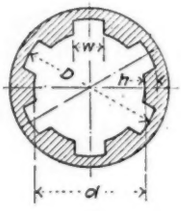
Six-Spline Fittings



6A
w = 0.250D
h = 0.050D
d = 0.900D

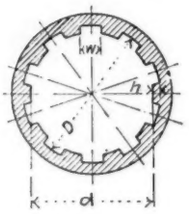


6B
w = 0.250D
h = 0.075D
d = 0.850D

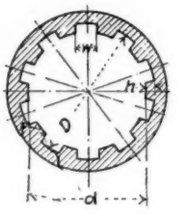


6C
w = 0.250D
h = 0.100D
d = 0.800D

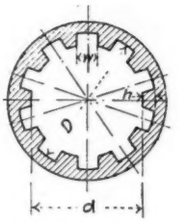
Ten-Spline Fittings



10A
w = 0.156D
h = 0.045D
d = 0.910D



10B
w = 0.156D
h = 0.070D
d = 0.860D



10C
w = 0.156D
h = 0.095D
d = 0.810D

DIMENSIONS FOR 6-SPLINE SHAFT FITTINGS

6A—PERMANENT FIT								6B—TO SLIDE WHEN NOT UNDER LOAD								6C—TO SLIDE WHEN UNDER LOAD							
Nom Diam	D		d		w		T[1]	Nom Diam	D		d		w		T[1]	Nom Diam	D		d		w		T[1]
	max	min	max	min	max	min			max	min	max	min	max	min			max	min	max	min	max	min	
¾	0.750	0.749	0.675	0.674	0.188	0.186	80	¾	0.750	0.749	0.638	0.637	0.188	0.186	117	¾	0.750	0.749	0.600	0.599	0.188	0.186	152
⅞	0.875	0.874	0.788	0.787	0.219	0.217	109	⅞	0.875	0.874	0.744	0.743	0.219	0.217	159	⅞	0.875	0.874	0.700	0.699	0.219	0.217	207
1	1.000	0.999	0.900	0.899	0.250	0.248	143	1	1.000	0.999	0.850	0.849	0.250	0.248	208	1	1.000	0.999	0.800	0.799	0.250	0.248	270
1⅛	1.125	1.124	1.013	1.012	0.281	0.279	180	1⅛	1.125	1.124	0.956	0.955	0.281	0.279	263	1⅛	1.125	1.124	0.900	0.899	0.281	0.279	342
1¼	1.250	1.249	1.125	1.124	0.313	0.311	223	1¼	1.250	1.249	1.063	1.062	0.313	0.311	325	1¼	1.250	1.249	1.000	0.999	0.313	0.311	421
1⅜	1.375	1.374	1.238	1.237	0.344	0.342	269	1⅜	1.375	1.374	1.169	1.168	0.344	0.342	393	1⅜	1.375	1.374	1.100	1.099	0.344	0.342	510
1½	1.500	1.499	1.350	1.349	0.375	0.373	321	1½	1.500	1.499	1.275	1.274	0.375	0.373	468	1½	1.500	1.499	1.200	1.199	0.375	0.373	608
1⅝	1.625	1.624	1.463	1.462	0.406	0.404	376	1⅝	1.625	1.624	1.381	1.380	0.406	0.404	550	1⅝	1.625	1.624	1.300	1.299	0.406	0.404	713
1¾	1.750	1.749	1.575	1.574	0.438	0.436	436	1¾	1.750	1.749	1.488	1.487	0.438	0.436	637	1¾	1.750	1.749	1.400	1.399	0.438	0.436	827
2	2.000	1.998	1.800	1.798	0.500	0.497	570	2	2.000	1.998	1.700	1.698	0.500	0.497	833	2	2.000	1.998	1.600	1.598	0.500	0.497	1080
2¼	2.250	2.248	2.025	2.023	0.563	0.560	721	2¼	2.250	2.248	1.913	1.912	0.563	0.560	1052	2¼	2.250	2.248	1.800	1.798	0.563	0.560	1367
2½	2.500	2.498	2.250	2.248	0.625	0.622	891	2½	2.500	2.498	2.125	2.123	0.625	0.622	1300	2½	2.500	2.498	2.000	1.998	0.625	0.622	1688
3	3.000	2.998	2.700	2.698	0.750	0.747	1283	3	3.000	2.998	2.550	2.548	0.750	0.747	1873	3	3.000	2.998	2.400	2.398	0.750	0.747	2430

Dimensions in inches.
Radii on edges of splines not to exceed 0.015 in.
Splines shall not be more than 0.006 in. per ft. out of parallel with respect to the axis of the shaft.
[1]Torque = 1000x16x mean Rxhx1 = pound-inches torque capacity per inch of bearing length at 1000 lb. pressure per sq. in. on side of splines. No allowance is made for radii on edges or for clearances.

DIMENSIONS FOR 10-SPLINE SHAFT FITTINGS

10A—PERMANENT FIT								10B—TO SLIDE WHEN NOT UNDER LOAD								10C—TO SLIDE WHEN UNDER LOAD							
Nom Diam	D		d		w		T[1]	Nom Diam	D		d		w		T[1]	Nom Diam	D		d		w		T[1]
	max	min	max	min	max	min			max	min	max	min	max	min			max	min	max	min	max	min	
¾	0.750	0.749	0.683	0.682	0.117	0.115	120	¾	0.750	0.749	0.645	0.644	0.117	0.115	183	¾	0.750	0.749	0 608	0.607	0.117	0.115	241
⅞	0.875	0.874	0.796	0.795	0.137	0.135	165	⅞	0.875	0.874	0.753	0.752	0.137	0.135	248	⅞	0.875	0.874	0.709	0.708	0.137	0.135	329
1	1.000	0.999	0.910	0.909	0.156	0.154	215	1	1.000	0.999	0.860	0.859	0.156	0.154	326	1	1.000	0.999	0.810	0.809	0.156	0.154	430
1⅛	1.125	1.124	1.024	1.023	0.176	0.174	271	1⅛	1.125	1.124	0.968	0.967	0.176	0.174	412	1⅛	1.125	1.124	0.911	0.910	0.176	0.174	545
1¼	1.250	1.249	1.138	1.137	0.195	0.193	336	1¼	1.250	1.249	1.075	1.074	0.195	0.193	508	1¼	1.250	1.249	1.013	1.012	0.195	0.193	672
1⅜	1.375	1.374	1.251	1.250	0.215	0.213	406	1⅜	1.375	1.374	1.183	1.182	0.215	0.213	614	1⅜	1.375	1.374	1.114	1.113	0.215	0.213	813
1½	1.500	1.499	1.365	1.364	0.234	0.232	483	1½	1.500	1.499	1.290	1.289	0.234	0.232	732	1½	1.500	1.499	1.215	1.214	0.234	0.232	967
1⅝	1.625	1.624	1.479	1.478	0.254	0.252	566	1⅝	1.625	1.624	1.398	1.397	0.254	0.252	860	1⅝	1.625	1.624	1.316	1.315	0.254	0.252	1135
1¾	1.750	1.749	1.593	1.592	0.273	0.271	658	1¾	1.750	1.749	1.505	1.504	0.273	0.271	997	1¾	1.750	1.749	1.418	1.417	0.273	0.271	1316
2	2.000	1.998	1.820	1.818	0.312	0.309	860	2	2.000	1.998	1.720	1.718	0.312	0.309	1302	2	2.000	1.998	1.620	1.618	0.312	0.309	1720
2¼	2.250	2.248	2.048	2.046	0.351	0.348	1088	2¼	2.250	2.248	1.935	1.933	0.351	0.348	1647	2¼	2.250	2.248	1.823	1.821	0.351	0.348	2176
2½	2.500	2.498	2.275	2.273	0.390	0.387	1343	2½	2.500	2.498	2.150	2.148	0.390	0.387	2034	2½	2.500	2.498	2.025	2.023	0.390	0.387	2688
3	3.000	2.998	2.730	2.728	0.468	0.465	1934	3	3.000	2.998	2.580	2.578	0.468	0.465	2929	3	3.000	2.998	2.430	2.428	0.468	0.465	3869
3½	3.500	3.497	3.185	3.182	0.546	0.543	2632	3½	3.500	3.497	3.010	3.007	0.546	0.543	3987	3½	3.500	3.497	2.835	2.832	0.546	0.543	5266
4	4.000	3.997	3.640	3.637	0.624	0.621	3438	4	4.000	3.997	3.440	3.437	0.624	0.621	5208	4	4.000	3.997	3.240	3.237	0.624	0.621	6878
4½	4.500	4.497	4.095	4.092	0.702	0.699	4351	4½	4.500	4.497	3.870	3.867	0.702	0.699	6591	4½	4.500	4.497	3.645	3.642	0.702	0.699	8705
5	5.000	4.997	4.550	4.547	0.780	0.777	5371	5	5.000	4.997	4.300	4.297	0.780	0.777	8137	5	5.000	4.997	4.050	4.047	0.780	0.777	10746
5½	5.500	5.497	5.005	5.002	0.858	0.855	6500	5½	5.500	5.497	4.730	4.727	0.858	0.855	9846	5½	5.500	5.497	4.455	4.452	0.858	0.855	13002
6	6.000	5.997	5.460	5.457	0.936	0.933	7735	6	6.000	5.997	5.160	5.157	0.936	0.933	11718	6	6.000	5.997	4.860	4.857	0.936	0.933	15475

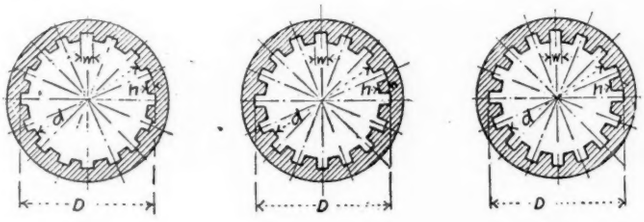
Dimensions in inches.
Radii on corner of splines not to exceed 0.015 in.
Splines shall not be more than 0.006 in. per ft. out of parallel with respect to the axis of the shaft.
[1]Torque = 1000x10x mean Rxhx1 = pound-inches torque capacity per inch of bearing length at 1000 lb. pressure per sq. in. on sides of splines. No allowance is made for radii on edges or for clearances.

Sixteen-Spline Fittings

DIMENSIONS FOR 16-SPLINE SHAFT FITTINGS

16A—PERMANENT FIT								16B—TO SLIDE WHEN NOT UNDER LOAD								16C—TO SLIDE WHEN UNDER LOAD							
	D		d		w		T	Nom Diam	D		d		w		T[1]	Nom Diam	D		d		w		T
	max	min	max	min	max	min			max	min	max	min	max	min			max	min	max	min	max	min	
-	2.000	1.997	1.820	1.817	0.196	0.193	1375	2	2.000	1.997	1.720	1.717	0.196	0.193	2083	2	2.000	1.997	1.620	1.617	0.196	0.193	2751
2½	2.500	2.497	2.275	2.273	0.245	0.242	2149	2½	2.500	2.497	2.150	2.147	0.245	0.242	3255	2½	2.500	2.497	2.025	2.022	0.245	0.242	4299
3	3.000	2.997	2.730	2.727	0.294	0.291	3094	3	3.000	2.997	2.580	2.577	0.294	0.291	4687	3	3.000	2.997	2.430	2.427	0.294	0.291	6190
3½	3.500	3.497	3.185	3.182	0.343	0.340	4212	3½	3.500	3.497	3.010	3.007	0.343	0.340	6378	3½	3.500	3.497	2.835	2.832	0.343	0.340	8426
4	4.000	3.997	3.640	3.637	0.392	0.389	5501	4	4.000	3.997	3.440	3.437	0.392	0.389	8333	4	4.000	3.997	3.240	3.237	0.392	0.389	11005
4½	4.500	4.497	4.095	4.092	0.441	0.438	6962	4½	4.500	4.497	3.870	3.867	0.441	0.438	10546	4½	4.500	4.497	3.645	3.642	0.441	0.438	13928
5	5.000	4.997	4.550	4.547	0.490	0.487	8595	5	5.000	4.997	4.300	4.297	0.490	0.487	13020	5	5.000	4.997	4.050	4.047	0.490	0.487	17195
5½	5.500	5.497	5.005	5.002	0.539	0.536	10395	5½	5.500	5.497	4.730	4.727	0.539	0.536	15754	5½	5.500	5.497	4.455	4.452	0.539	0.536	20806
6	6.000	5.997	5.460	5.457	0.588	0.585	12377	6	6.000	5.997	5.160	5.157	0.588	0.585	18749	6	6.000	5.997	4.860	4.857	0.588	0.585	24760

Dimensions in inches.
Radii on corner of splines not to exceed 0.015 in.
Splines shall not be more than 0.006 in. per ft. out of parallel with respect to the axis of the shaft.
[1]Torque = 1000x26x mean Rxhx1 = pound-inches torque capacity per inch of bearing length at 1000 lb. pressure per sq. in. on sides of splines. No allowance is made for radii on edges or for clearances.



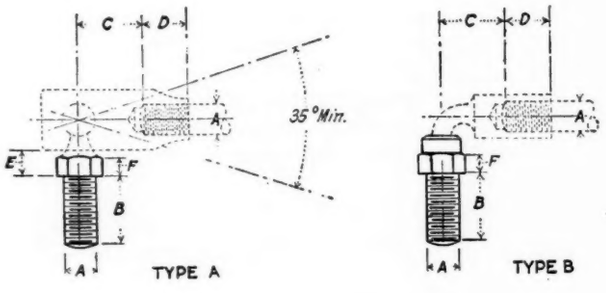
16A
w = 0.098D
h = 0.045D
d = 0.910D

16B
w = 0.098D
h = 0.070D
d = 0.860D

16C
w = 0.098D
h = 0.095D
d.= 0.810D

Ball-and-Socket Joints

The following standard applies to the two most widely used types of ball-and-socket joints and the series of sizes meets all general requirements for spark and throttle control.



Dimensions for Ball-and-Socket Joints

A	Hex Min	B	C	D	E[1]	F[2] Min
No. 5-40	¼	9/32	¼	¼	7/32	3/32
No. 8-32	¼	11/32	11/32	9/16	7/32	7/64
No. 10-32	5/16	13/32	13/32	3/8	¼	1/8
No. 12-32	3/8	15/32	3/16	3/8	¼	9/64
¼-28	3/8	9/16	1/2	7/16	9/32	5/32
5/16-24	7/16	23/32	5/8	9/16	9/32	5/16
3/8-24	9/16	7/8	3/4	11/16	5/16	7/32
7/16-20	5/8	1	7/8	13/16	3/8	¼
½-20	3/4	1 1/8	1	15/16	7/16	9/32

[1]Minimum wrench clearance.
[2]F = ⅛ A ± 1/32.
Dimensions in inches.
All threads are S.A.E.

Brake-Shaft Bushings

This subject was suggested as suitable for standardization by a manufacturer of oilless bearings, as practically every automobile builder specifies a different size bushing for brake-shaft rods, necessitating making these parts to order. Data obtained from the industry indicates a wide diversity in the construction of bushings, and the accompanying table represents a greater reduction in the number of sizes.

Inside Diameter[1]	Length		Inside Diameter[1]	Length	
¼	5/16	¼	7/8	2 1/32	7/8
5/16	¼	5/16	1 5/16	1 1/16	1 5/16
3/8	9/32	3/8	1	¾	1
7/16	5/16	7/16	1 1/8	7/8	1 1/8
½	3/8	½	1 ¼	1 5/16	1 ¼
9/16	7/16	9/16	1 3/8	1	1 3/8
5/8	15/32	5/8	1 ½	1 1/8	1 ½
1 1/16	½	1 1/16	1 5/8	1 ¼	1 5/8
¾	9/16	¾	1 ¾	1 5/16	1 ¾
1 3/16	5/8	1 3/16	2	1 ½	2

Dimensions in inches.
Wall thickness: below 1¼ in. inside diameter, 1/32, 1/16, and ⅛ in.; above and including 1¼ in. inside diameter , 1/32, 1/16, ⅛ and 3/16 in.
[1]Inside diameter tolerances: below 1 in., +0.001 or +0.003 in.; above and including 1 in. +0.001 and +0.004 in.

Tungsten Steel

Low-tungsten steel is more widely used for both inlet and exhaust valves than high-tungsten steel. The analysis proposed conforms to Specification No. W60b of the Bureau of Aircraft Production.

Specification No. 7260
Composition in Percentage

Carbon	0.50 to 0.70
Manganese, not to exceed	0.30
Phosphorus, not to exceed	0.035
Sulphur, not to exceed	0.035
Chromium	0.50 to 1.00
Tungsten	1.50 to 2.00

Nickel Steel

Specification No. 2512
Composition in Percentage

Carbon, not to exceed	0.17
Manganese	0.30 to 0.60
Sulphur, not to exceed	0.045
Phosphorus, not to exceed	0.04
Nickel	4.50 to 5.25

Malleable Iron Castings*

Material Covered These specifications cover malleable castings for general automotive purposes.

Process The castings shall be produced by either the air-furnace, open-hearth, or electric-furnace process.

Physical Properties and Tests

Tension Tests The tension test specimens specified shall conform to the following minimum requirements as to tensile properties:

Tensile strength, lb. per sq. in.	45,000
Elongation in 2 in., per cent	7.5

Special Tests All castings, if of sufficient size, shall have cast thereon test-lugs of a size proportional to the thickness of the casting, but not exceeding ⅝ by ¾ in. in cross-section. On castings which are 24 in. or over in length, a test-lug shall be cast near each end. These test-lugs shall be attached to the casting at such a point that they will not interfere with the assembling of the castings, and may be broken off by the inspector.

If the purchaser or his representative so desires, a casting may be tested to destruction. Such a casting shall show good, tough malleable iron.

Tension Test Specimens Tension test-specimens shall be of the form and dimensions shown in Fig. 1. Specimens whose mean diameter at the smallest section is less than 19/32 in. will not be accepted for test.

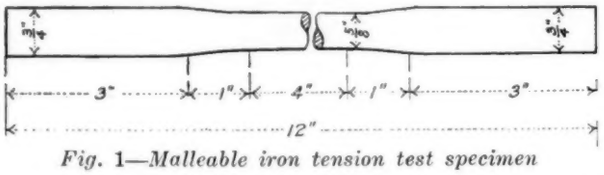


Fig. 1—Malleable iron tension test specimen

A set of three tension test-specimens shall be cast from each melt, without chills, using heavy risers of sufficient height to secure sound bars. The specimens shall be suitably marked for identification with the melt. Each set of specimens so cast shall be placed in some one oven containing castings to be annealed.

Number of Tests After annealing, three tension test-specimens shall be selected by the inspector as representing the castings in oven from which these specimens are taken.

If the first specimen conforms to the specified requirements, or if, in the event of failure of the first specimen, the second and third specimens conform to the requirements, the castings in that oven shall be accepted, except that any casting may be rejected if its test-lug shows that it has not been properly annealed. If either the second or third specimen fails to conform to the requirements, the entire contents of that oven shall be rejected.

Reannealing Any castings rejected for insufficient annealing may be reannealed once. The reannealed castings shall be inspected and if the remaining test-lugs, or castings broken as specimens, show the castings to be thoroughly annealed, they shall be accepted; if not, they shall be finally rejected.

Workmanship and Finish

Workmanship The castings shall conform substantially to the patterns or drawings furnished by the purchaser, and also to gages which may be specified in individual cases. The castings shall be made in a workmanlike manner. A variation of ⅛ in. per ft. will be permitted.

Finish The castings shall be free from injurious defects.

Marking

Marking The manufacturer's identification mark and the pattern numbers assigned by the purchaser shall be cast on all castings of sufficient size, in such positions that they will not interfere with the service of the castings.

Inspection and Rejection

Inspection The inspector representing the purchaser shall have free entry at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the castings ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the castings are being furnished in accordance with these specifications. All tests and inspection shall be made at the place of manufacture prior to shipment, unless otherwise specified, and shall be so conducted as not to interfere unnecessarily with the operation of the works.

The manufacturer shall be required to keep a record of each melt from which castings are produced, showing tensile strength and elongation of test-specimens cast from such melts. These records shall be available and shown to the inspector whenever required.

Rejection Castings which show injurious defects subsequent to their acceptance at the manufacturer's works may be rejected, and, if rejected, shall be replaced by the manufacturer free of cost to the purchaser.

*This specification conforms to Specification No. A47-19 of the American Society for Testing Materials.

High-Chromium Steel

High-chromium, or what is called stainless steel, containing from 11 to 14 per cent chromium, was originally developed for cutlery purposes, but has in the past few years been used to a considerable extent for exhaust valves in airplane engines because of its resistance to oxidation or scaling at high temperatures.

Composition in percentage

Carbon	0.20 to 0.40	Sulphur, not to exceed	0.035
Manganese, not to exceed	0.50	Chromium	11.50 to 14.00
Phosphorus, not to exceed	0.035	Silicon, not to exceed	0.30

Forging The steel should be heated slowly and forged at a temperature above 1750 deg. fahr., preferably between 1800 and 2200 deg. fahr. If forged at temperatures between 1650 and 1750 deg. fahr. there is considerable danger of rupturing the steel because of its hardness at red heat. Owing to the air-hardening property of the steel, the drop-forgings should be trimmed while hot. Thin forgings should be reheated to redness before trimming, as otherwise they are liable to crack.

Heat Treatment Forgings will be hard if they are allowed to cool in air. This hardness varies over a range of from 250 to 500 Brinell, depending on the original forging temperature.

Annealing This can be done by heating to temperatures ranging from 1290 to 1380 deg. fahr. and cooling in air or quenching in water or oil. After this treatment the forgings will have a hardness of about 200 Brinell and a tensile strength of 100,000 to 112,000 lb. per sq. in. If softer forgings are desired they can be heated to a temperature of from 1560 to 1650 deg. fahr. and cooled very slowly. Although softer the forgings will not machine as smoothly as when annealed at the lower temperature.

Hardening The forgings can be hardened by cooling in still air or quenching in oil or water from a temperature between 1650 and 1750 deg. fahr.

Physical Properties The physical properties do not vary greatly when the carbon is within the range of composition given, or when the steel is hardened and tempered in air, oil, or water.

(Owing to the unusual number of recommendations made at the Winter Meeting it will be necessary to print the remainder of the report in an early issue.)

Canada Registers 355,433 Cars and Trucks

The ownership of automotive vehicles in Canada suggests the great potential market in the Dominion, when studied in connection with the population and the possibilities of development. The writer, in presenting the figures he has gathered from many sources, reviews the possibilities of the future and points out where and why the manufacturer should look well into this field

By G. C. Porter

IN the nine provinces of Canada there were registered in 1919 355,433 automobiles and trucks. In 1918 the registration was 269,727, an increase for 1919 of 85,706. In 1917 the register showed for the Dominion 198,739, making the increase in 1918 over 1917 70,983. The table covering eleven years' registration shows that the cars in the nine provinces double every two years. The last federal census of 1911 gave Canada a population of 7,206,643. Based upon this last authentic record there is one car or truck in Canada for each 20.4 people. The prairie provinces of Manitoba, Saskatchewan and Alberta, where the percentage of gains are heaviest, had a special census in 1916. The population was 1,698,220. During 1919 in these three provinces there were registered 122,922 cars, one for every 13.8 persons.

The average price per car, based upon purchase figure, varies east or west from Toronto, according to the freight tariff. While the average purchase price in Ontario was $1,437 in 1919, it was but $1,087 in 1916, while British Columbia showed an average in 1916 of $1,055, though in 1919 the average increase was not so high as compared with Toronto, being but $1,400. Based upon the average in each province for 1919, the total aggregate book value of cars in Canada totaled $549,316,000.

Farmers Own Most Cars

Dominion statistics show that rural communities own two-thirds of the automobiles. The estimate, based upon returns to Sept. 1, which, while representative, cannot be said to be absolutely accurate because many cars purchased and registered from country districts later appear in cities, while the reverse is sometimes true, shows ownership as follows: In cities, 124,234; cars in towns, villages and townships, 231,199. The increased number of expensive touring cars among the farming element of the west is rapidly balancing the monopoly of the cities in these fine types.

While Ontario leads all provinces with a total of 151,623, the next jumps to the far west with Saskatchewan second with 54,754, and then back east to Quebec with 40,557.

The registration of motorcycles is not compulsory except in cities of the Dominion. In 1918 Toronto registered 5,002, and in 1919, to Sept. 1, 8,210. Automobile club authorities estimate, with no complete record, that there are but 30,000 motorcycles in the Dominion.

Farm tractors are not registered. The records, not wholly complete, are obtained through agricultural department reports of farm property. This record shows on the prairies 26,832 tractors for 1919 as compared with 19,777 in 1918 and 14,200 in 1917. In this field is the most prolific potential source of increase for to-day. The tractor is the subject of chief discussion among western farmers. Based upon the use of one tractor for each half section of the known available farm lands in the west, there is a potential market here for 513,171 more farm tractors.

The small tractor is chiefly in demand in the west. The registration figures show that of the automobiles recorded, the 25-hp. and less covers 265,210 of the total, with the 26 to 30 second with 28,212.

Would Raise Fee

The registration fees of the various provinces average $10 a car, but automobile clubs all over the Dominion are agitating to have the fee increased to $20. All revenue from this source goes to the good roads fund. In 1918 from this source $2,940,912 was collected in the province, and in 1919 $3,867,939, an increase of $927,027.

The only difference of opinion as to what shall be done with this revenue lies between the city and rural owner. The farmers insist on "feeder" roads being constructed in preference to the main trunk line system, while the urban dweller insists on a great "coast to coast" highway, with the "feeders" as a secondary consideration. With the increased use of cars, the subject of highways and an exchange license system with the States are subjects alertly discussed in Canada.

At present foreign cars may pass through Canada with no restrictions at the border, other than registration with the officials at the port of entry. If the car is to be used for pleasure, the owner may remain with same in Canada without tax for six months, but in that event a bond for the duty value of the machine must be filed at the border or at the nearest city.

These regulations are not burdensome, as evidenced by the fact that at one port of entry in British Columbia last year, Blaine, 23,000 cars passed through in 1918, and this year 38,000 were registered as passing that point, though some of these were probably duplicates.

A piece of highway was completed of the Canadian national system this year, between Ft. William and Duluth, and, according to the statement made to the writer by National Highway Commissioner Pitt of Dryden, Ont., 10,000 cars passed over this line from the States into Canada. The federal and provincial governments are adding millions to the highway fund for every thousand collected from fees. This year the Dominion Highways act provided $20,000,000 for this purpose, while Ontario spent $15,000,000 and employed 500 men for the year in the work. Of the 9500 miles of country roads in Ontario 3000 are now macadamized.

The Road Plans

While the farmers, who are a powerful political force in Canada to-day, will not support the demand for "auto-

mobile traffic highways," the same thing has their approval under the name of "colonization roads," so this problem is practically solved. The methods of raising money for the improved highways and the course across Canada of the "coast to coast" road are the big factors of discussion in the Dominion. Commissioner Pitt insists that the country wants and requires "all weather" roads. For instance, on the prairies, for 1500 miles, in spring, summer and fall the bald prairie sod affords the ideal road, whereas in the maritime provinces and in British Columbia much of the highway must be hewed from the living rock.

The average automobile club favors a "coast to coast" highway direct, only considering the big centers of population. The rural sections demand a coast to coast highway that is not so direct but depends upon the natural settlement of the country, even though it covers twice the distance. By this method they claim much of the through highway will serve country traffic. This is probably the policy that will be adopted. Then it is favored that the actual work will be done by each province within its limits, agreeing by conference where the highway shall pass into adjacent provinces. Some such conferences have been held already.

As opposed to this, farmers prefer to have the work done separately by municipalities and townships, the provincial governments and federal merely supervising, encouraging and contributing. The raising of funds, it has been suggested, ought to be in the hands of a special bond issue under the direction of the federal authority, though at present the township and municipal organizations are raising funds by these special levies. Manitoba for 1920, it is estimated, will raise for this purpose in this special way $20,000,000.

Imported From U. S.

The last fiscal year 6473 passenger cars were imported from the States, valued at $5,326,510, according to the customs records, and 1741 commercial cars, valued at $2,263,418. The same records show that for the first seven months of 1919 there were 7466 passenger cars imported, valued at $6,954,594, and 1478 commercial cars and automobile equipment imported from the States in 1918, which paid duty, was valued at $6,600,000, and for the first seven months of 1919 this amounted to $8,757,200. In 1918 gasoline engines recorded as coming in and paying duty were $6,740,000, while in 1919 engines of this type paid duty on $9,420,700 and on $8,540,000 worth of tires.

With one notable exception no complete cars may be said to be manufactured in Canada. The duty, therefore, of from 45 to 56 per cent on complete cars is so heavy that this is avoided by many of the large manufacturers in the States assembling the cars on this side and some of them manufacturing here to still further reduce the duty on such parts, a part or two, in Canada.

There is no probability of this duty on passenger cars being reduced, but the duty for commercial cars will unquestionably come down; and if the farmers, now making aggressive progress politically, carry out their free trade ideas, and they may be in a position in 1923 to do it by control of the National Parliament, a very considerable percentage of these cars will be admitted duty free to Canada.

Registration Record for 11 Years

THIS table is a record of automobiles in Canada for the past ten years. The figures are official up to Sept. 1, 1919, and based upon Government estimates for the last quarter of 1919. There are no foreign registrations in these statistics.

The total cars registered in 1919 are 355,433, an increase over 1918 of 85,709. The total increased registrations in 1918 were 70,988. In 1917 the total increase was 78,421. In 1916 the increase was 32,645. In 1915 the increase was 20,258; 1914, 16,926; 1913, 15,700. Approximately the number of automobiles in Canada have doubled every two years.

Year	Ont.	Sask.	Quebec	Alta.	Man.	B. C.	N. S.	N. B.	P. E. I.	Total
1909	2,400	149	485	275	662	504	69	167	....	4,711
1910	4,200	531	786	423	1,524	1,026	148	299	....	8,937
1911	11,339	1,304	1,878	1,631	2,599	2,220	228	483	....	21,682
1912	16,266	2,268	3,535	2,505	4,770	4,289	456	700	....	34,789
1913	23,700	4,659	5,452	3,773	5,406	6,138	511	824	26	50,489
1914	31,724	8,027	7,413	4,728	7,001	6,688	544	1,260	30	67,415
1915	42,346	10,225	10,112	5,832	8,812	7,440	971	1,900	35	87,673
1916	54,375	15,000	15,347	9,703	11,953	8,576	1,728	2,986	50	120,318
1917	83,790	32,500	21,702	20,800	17,333	11,386	5,678	5,249	301	198,739
1918	109,374	47,239	28,338	29,500	24,389	15,828	8,103	6,475	481	269,727
1919	151,623	54,754	40,557	34,362	33,896	19,050	10,981	9,420	790	355,433

The Future

Canada's population and area suggest its vast potentiality as a user of motor vehicles. The federal census of 1911 showed a total population of 7,206,643. The approximate increase of 25 per cent in the intervening years brings the total estimated population at the opening of 1920 to 9,008,303. The area is 3,729,665 square miles, divided, land 3,603,910 square miles and water 125,755. A special census for the three prairie provinces, Manitoba, Saskatchewan and Alberta, was made under the federal act in 1916, showing a population for those provinces at that time of 1,698,220 as compared with 1,328,725 shown in the census of 1911, and with 419,512 in 1901, thus indicating an increase on the prairies in population from 1901 to 1916 of 1,278,708, or 305 per cent.

To the automotive industries there is special significance in these figures, since the Canadian prairie provinces are offering chief inducements as a market for cars, trucks and tractors of every description. It is a common expression with the trade that "the west has not been scratched." In Saskatchewan, for instance, with an area of 251,700 square miles and over 600,000 people, 90 per cent of the province is still open for settlement. Here is the appeal to the imagination of the trade western Canada makes: In 1919 these four provinces had an investment representing $200,000,000 in cars, had registered 142,062 as compared with 112,694 in 1918, costing $169,867,272. This astonishing progress has been made in the automotive industries in SPITE of the drain on the west in man power for the war, many of whom have not returned, for it was western Canada from which the bulk of Canada's half million army was derived.

While Canada's largest province is Quebec, and its richest is Ontario, the percentage of increase in car purchases lies with the prairies. Here is what the Canadian market affords, as an attraction and a promise to the automotive industries—Canada's annual production from the farm is $500,000,000; from her forests, $168,000,000 annually; from mines, $100,000,000 annually; fisheries,

$35,000,000 annually. This, from natural productions, averages $500 a family, and her annual production from manufacturers, amounting annually to $600,000,000, adds another $400 for each family in the Dominion, a total of $900 annually. This affords a rational illustration of Canada's purchasing power annually and her needs. The increased use of automotive products is out of all proportion to the consumption of other implements by rural and urban communities.

Increase of Fees

Government revenue derived from registered car licenses, official from records to Sept. 1, and approximated for the last quarter, follow. It is to be noted that there is an agitation all over Canada to have the registration fee doubled in order to supply a large fund for road purposes, but no province has taken this step in the closing days of 1919:

Province	1919	1918	Increase
Ontario	$1,605,271	$1,214,000	$391,271
Saskatchewan	600,371	513,512	86,859
Quebec	459,763	312,951	146.812
Alberta	379,432	300,379	79,053
Manitoba	371,701	267,612	104,089
British Columbia	209,292	172,361	36,931
Nova Scotia	125,130	85,239	39,891
New Brunswick	103,291	68,049	35,242
Prince Edward Island	13,688	6,809	6,879
Total	$3,867,939	$2,940,912	$927,027

Rural Ownership

Rural districts own practically two-thirds of all cars registered in Canada. Here is the municipal distribution according to registration in 1919:

Province	Cars owned in cities	Cars owned in towns, villages and townships
Ontario	50,947	100,676
Saskatchewan	17,602	37,152
Quebec	16,446	24,111
Alberta	9,987	24,375
Manitoba	12,012	21,884
British Columbia	8,529	10,521
Nova Scotia	4,280	6,701
New Brunswick	4,121	5,299
Prince Edward Island	310	480
Total	124,234	231,199

Excess in rural over urban, 106,965.

Value of Cars

This statistical matter is based upon a careful analysis of the motor car license registrations of each province, from dealers and automobile clubs. It is not a Government estimate:

Province	Average price per car, 1916	Average price per car, 1917	Average price per car, 1918	Average price per car, 1919	Total aggregate value, 1919
Ontario	$1,087	$1,015	$1,299	$1,437	$217,881,251
Sask.	1,210	1,018	1,395	1,750	95,809,500
Quebec	1,056	1,007	1,213	1,369	55,493,033
Alberta	1,314	1,127	1,544	1,681	57,762,522
Manitoba.	1,190	1,065	1,459	1,563	52,979,448
Br. Col.	1,411	1,370	1,875	2,076	39,547,800
Nova Scotia	1,089	1,065	1,279	1,398	15,351,438
New Bruns.	1,070	1,024	1,280	1,421	13,385,820
Prince E. I.	1,055	1,034	1,206	1,400	1,106,000

Total aggregate value of all registered cars in nine provinces, 1919 ..... $549,316,812

Statistics of Dominion

Here is the showing made by the federal census of 1911 for the entire Dominion:

Province	Population	Square miles	Rural	Urban
Prince Edward Island	93,728	2,184	78,758	14,970
Nova Scotia	492,338	21,428	306,210	186,128
New Brunswick	351,889	27,985	252,342	99,547
Quebec	2,003,232	706,834	1,032,618	970,614
Ontario	2,523,274	407,262	1,194,785	1,328,489
Manitoba	455,614	251,832	255,249	200,365
Saskatchewan	492,432	251,700	361,067	131,365
Alberta	374,663	255,285	232,726	141,937
British Columbia	392,480	335,855	188,796	203,684
Yukon	8,512	207,076	4,647	3,865
Northwest Territories	18,481	1,242,224	18,481	.....
Total in 1911	7,206,643	3,603,910	3,925,679	3,280,964

Degree of Ownership

The three prairie provinces show the following population according to the 1916 census:

		Cars in 1919	Per Capita
Manitoba	553,860	33,806	16.5
Saskatchewan	647,835	54,754	11.8
Alberta	496,525	34,806	14.3
Total	1,698,220	122,922	13.8

Classification of Types

Compiled from Governmental records and records of provincial auto clubs:

	For the Dominion
Touring cars	279,889
Runabouts	59,200
Coupes, sedans and limousines	13,809
Buses and ambulances	1,331
Taxicabs	1,204
Total	355,433

Occupation of Owners

Farmers, drovers and agrarian workers	138,713
Merchants and manufacturers	84,503
Skilled trades	42,932
Physicians	14,805
Other professions	16,291
Agents	14,932
Commercial travelers	12,010
Liverymen	8,820
Government and corporations	7,800
Unspecified	14,627
	355,433

Classification by Horsepower

25 horsepower and less	265,210
26 horsepower to 30	28,212
31 horsepower to 35	20,000
36 horsepower to 50	18,599
51 and over	1,942
Electric cars	15,422
Steam cars	983
Unclassified	5,065
Total	355,433

Tractor Record

Here is the record of three years in oil and gasoline tractors on the prairies of Canada, illustrating the fine market afforded for this class of machinery; returns from provincial agricultural departments:

Year	1917	1918	1919	Field crop acreage
Manitoba	1,613	3,631	5,503	4,837,660
Saskatchewan	8,610	10,937	14,207	14,678,042
Alberta	3,977	5,209	7,122	6,692,616
Total	14,200	19,777	26,832	26,208,318

The future of this field as a market for farm tractors can scarcely be exaggerated. The total surveyed acreage

of the three provinces is 133,544,393. Of this amount the department estimates that 133,215,577 is cultivable. The unsurveyed arcreage in each province equals 143,570,000, and the Government estimates that of this 31,002,186 acres are suitable for agriculture. This gives a total subject to farm operations of 164,217,763. With the total acreage under field crops in 1919 averaging less than 30,000,000 acres, less than one-fifth of the known farming section of Manitoba, Saskatchewan and Alberta have been brought under cultivation, and but 26,832 tractors were utilized in 1919 in that work. If one tractor is allowed for each half section, and this is about as much land as the tractor of average capacity can be relied upon to handle adequately, there is a market at present in western Canada for precisely 513,171 tractors.

Ten years ago the farm tractor was practically unknown on these prairies. Then a few of the $5,000 giant tractors were brought into the country. They proved a failure. They were too large for ordinary purposes and required an expert mechanic in constant charge. Their failure set back the tractor market five years.

Suspicion Overcome

Then the smaller variety came in, but the farmers accepted them with suspicion. The war production campaign created the demand and the Government permitted machines of $1,400 value to be brought in duty free. Then it became a rush to obtain tractors.

The majority in use to-day are gasoline-driven machines of the 12-25 and 15-30 type. The second is the 10-20 and 15-30 machine, with the 10-20 and 12-24 third. Dealers at the close of 1919 predicted an unprecedented business for 1920, chiefly limited by ability to get stock. It is estimated that orders for 20,000 medium-priced farm tractors have already been taken for 1920 delivery. Fall plowing is the rule in Canada west, and these will be utilized specially for breaking in the fall of 1920. Conservative dealers have estimated that 40,000 tractors will be sold in Canada.

Special war taxes have not discouraged the importation of automobiles, trucks and tractors, and the orders placed for 1920 cars with dealers, domestic and foreign, are of such volume that there is no suggestion of diminishing business. In fact the increase has been steady during the war in spite of the obstacles and the prohibition of importations of expensive cars during a part of 1917-18 as a war measure. The tax operates heavily, averaging from 45 per cent to 57, and there is no indication from the state of the public mind that there will be a reduction, at least in the tariff on pleasure vehicles.

There is a tendency to insist on a reduction for trucks and all forms of tractors, and the experiment tried by the Government of admitting in 1917-18 tractors valued at less than $1,400 duty free to encourage intensive war production has established a precedent which the agricultural interests are pressing as a permanent feature of the tariff.

The official figures of the federal Department of Trade and Commerce, for the first six months of 1919, show importations of 7688 cars, valued at $8,007,261, compared with 5689 cars imported for the same period in 1918, valued at $5,018,941, an increase in the number of 35 per cent.

The record of importations for 1918, in spite of the excess war tax show 17,284 cars brought into Canada from the United States, valued at $12,592,424. The department estimates that for the last half of 1919 11,500 cars were imported into Canada, valued at $12,900,000, making for 1919 an approximate valuation of cars imported of $20,907,261. Thus approximately 1904 more cars came into Canada through the customs in 1919 than in 1918, valued at $8,314,833 more than the imports of 1918. The number, it is estimated, would have been larger if there had not been so much difficulty in getting certain types and the increased expense of the exchange rate. But dealers in Canada, on the whole, assert that increased cost of stock and delivery have not figured to any considerable extent in discouraging the importation of cars from the States.

In the Future

Dealers are united in their forecast of an extraordinary demand for cars in Canada during 1920. The writer has, during the past three months, talked with dealers from all parts of Canada. Many predict that it will be an extraordinary year for the sale of automotive supplies in Canada, limited probably only by the supply. Some have predicted that the number of cars will be doubled if they can be obtained, regardless of price or other obstacles.

There are circumstances that have been encouraging the location in Canada of automobile manufactories. The feeling that this is good business has been increased by the increasing tariff difficulties and the new British preference for Canadian-made machines. The domestic market, too, has been a lure of no small magnitude. The rise, however, of the agrarian political forces, with their resolution to lower all tariffs and especially those touching farm machinery, in which class they have placed all tractor vehicles and the automobiles and trucks of moderate value, has in a measure arrested any movement of branch establishment from the States.

The big issue may be decided in fact during 1920, as a federal election is forecasted. There are 235 seats in Parliament. The farmers are conceded 85 by the well-informed, with a possible coalition of low-tariff Liberals that might conceivably give the element leaning toward free trade or a greatly reduced tariff control of the Government. However, empire trade conditions and domestic business and patriotic considerations rather favor a political combination in Canada that will make for the success of the so-called national policy of the late Sir John A. Macdonald, around which the protective tariff interests centered.

So, upon this score, it is not generally believed there can be very much reduction in the customs tariff for some time to come if at all, and then only upon a graded scale, ordered by a well-balanced tariff commission. There is no such body to-day in the Canadian scheme of government.

As to Manufacturing

There is but little more than assembling automobile plants in Canada, with one notable exception. As an evidence, however, of the growth in this direction, the 1910 census gave the products of domestic auto factories a value of $6,251,885. In the next five years, according to Government figures, it reached the total of $24,357,627. In 1917 the production of domestic cars and tractors was valued at $54,668,255. The total value in 1918 was $97,654,000, and for 1919, it is estimated by the Trade and Commerce Department, that the home production, chiefly, however, assembled parts imported from the States, will reach quite $150,000,000. The expansion is tending to make the domestic factories self-containing.

In fact Canada is to-day EXPORTING cars and tractors, assembled here. In the first seven months of 1919, 7691 automobiles had been exported as compared with 4440 for the same period in 1918, a gain of 73 per cent. Of this number 6609 were passenger cars and 1082 trucks. The exports this year were valued at $5,245,651 as compared to $2,144,631 for the 1918 period. British India was the chief purchaser of these Canadian cars.

The Trend of the Oil Industry in 1919*

The relationship between oil and the automotive industry is very close, but the fact remains that this relationship is not yet so important as to make oil statistics, standing alone, important or illuminative to the automotive industry. So we have asked that the oil figures be interpreted by Joseph E. Pogue, who knows both the oil industry and the automotive tendencies

By Joseph E. Pogue

Introduction

THE oil industry, which provides both fuel and lubrication for automotive transportation, is intimately related, in an economic sense, to the automotive industry, and no view of the one is complete which does not include a survey of the other. The growth of these two great industrial agencies, which are responsible for the production and consumption of the country's supply of automotive power, must proceed hand in hand, if all interests are to be effectively served; and any changes that may be taking place in the oil industry, whether in quantity, character, or price of either motor-fuel or motor-oil, have a direct cause and effect connection with the course of automotive construction and the progress of automotive transportation. With this close inter-relationship in the foreground, the present article reviews briefly the development of the oil industry during the past year, and attempts to provide the information necessary to a correct appraisal of the situation from an automotive standpoint.

*This review was written in December, before official statistics for the entire year of 1919 were available. The figures given for 1919, therefore, are estimates, based upon exact data obtained for the first nine or ten months and extended to the end of the year by means of graphic computations. The departure from the final figures—which will not be available for some months yet—is not thought to be sufficient to affect materially the general view.

Crude Petroleum

The supply of crude petroleum, the dominant source of both motor-fuel and motor-oil, is determined by the size of the domestic production, the quantity imported, and the extent to which the crude petroleum in storage (the so-called stocks) increased or diminished during the year. This combined situation is shown graphically in Figs. 1 and 4, and numerically in the table.

From these three comparative views, it may be seen that despite increases in domestic production and imports, the stocks were not materially enlarged, which is equivalent to saying that demand and supply were nicely balanced during the year. This is the more notable in view of the sensational developments of new pools in northern Texas and northern Louisiana, which attained so much notoriety in the last half of the year, but which, augmented by enlarged imports, were just able to stem the draft on stocks that had been taking place all through 1918. During 1919, therefore, the crude petroleum situation "held its own," in contrast to 1918, whose output fell behind demand, as evidenced by a notable decrease in stocks during that year.

In the early part of 1919, the United States Geological Survey published an estimate of the unmined supply of

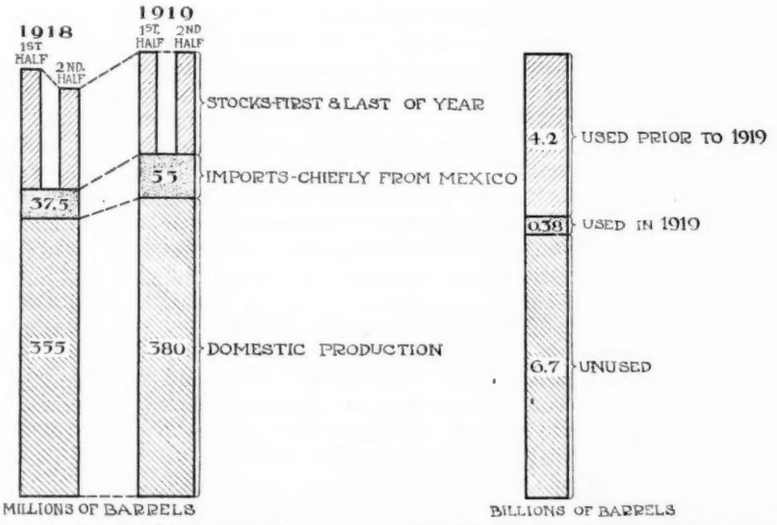


Fig. 1—A graphic comparison of the crude petroleum situation in 1918 and 1919

Fig. 2—The unmined supply of crude petroleum in the United States, according to estimates of U. S. Geological Survey

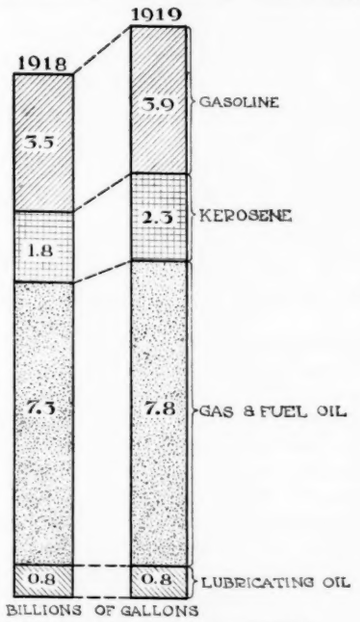


Fig. 3—A graphic comparison of the petroleum products situation in 1918 and 1919

crude petroleum in the United States.[1] Inventories of this kind are of the utmost importance and should be given careful attention. The results are interpreted graphically in Fig. 2.

The Refining Situation

During 1919 there was considerable activity in constructing and projecting new refineries, and a notable expansion in the oil-refining branch of the petroleum industry was the result. In fact, refinery capacity, both actual and potential, increased out of proportion to the growth in the supply of crude petroleum, including imports. It is evident that refinery expansion took place with an eye to the actual and impending demand for oil products, counting upon the new pools of Texas and Louisiana, and especially Mexico, to supply the extra raw material for operation.

The materials turned out by the oil industry are, in general terms, gasoline, kerosene, fuel oil, lubricating oil, and a number of less consequential products which may be left to one side in this review. There is an intimate relationship between the four main products noted, and all four must be held in view in considering the developments in respect to any one. The country's output of these products in 1919, as compared with 1918, is shown graphically in Fig. 3.

Gasoline—The oil product of greatest interest to the automotive industry is naturally gasoline. The output of gasoline in 1919 (see Fig. 3 and the table) increased about 9 per cent over that of 1918, thus failing to maintain the rate of 30 per cent established in 1918. This slowing up in gasoline production was in response to an impaired export situation due to the cessation of the war, combined with a domestic demand that failed to sustain its 1918 promise. In short, the oil situation was so stimulated by the closing year of the war that it overran slightly the automotive demand, which not only failed to receive an equal stimulation by post-war conditions, but actually suffered a retardation with a wave of effect felt throughout 1919. In consequence, it is not surprising to find at the close of the summer a slight overproduction of gasoline, which even went so far as to be an embarrassment to some refiners. This situation can be easily misinterpreted by the automotive industry as being the result of normal rather than abnormal conditions.

Although detailed figures are not immediately at hand to sustain the contention, the decrease in volatility (raise in endpoint) of gasoline, which was so conspicuously taking place in 1918, is judged to have pursued a more temperate course in 1919. At least, there was less need in the latter year for the supply of gasoline to be augmented in this manner, especially as increments from cracking methods of distillation and from casing head

[1] See bibliography at end of article.

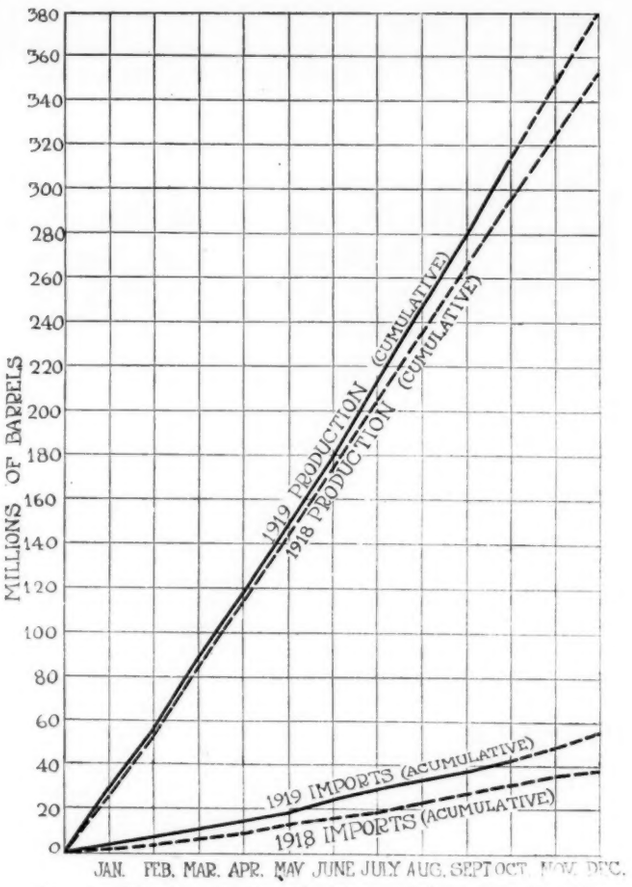


Fig. 4—The trend of production and imports of crude petroleum in 1918 *and* 1919

blends had been increasing apace. In the face of these circumstances, it is the more notable that the Government, in late 1919, changed its gasoline specifications to accommodate a less volatile product, thus showing its foresight in the direction of lining up for the greatly augmented demand expected in 1920.

Kerosene—Of the four main petroleum products, the most notable changes took place in respect to kerosene. (See Figs. 3 and 5 and the table). The output in 1919 increased nearly 27 per cent, as compared with a 13 per cent increase in 1918, thus reversing the course of development that characterized gasoline, which, as we have seen, showed a much greater rate of increase in 1918 than in 1919. This acceleration in the output of kerosene, in contrast with gasoline, was undoubtedly due in the main to the opening up of foreign markets to kerosene, especially since normally this country has depended upon foreign trade for the placement of approximately half of its kero-

The Development of the Oil Industry in 1919

	Official Figures				Estimated Figures		
	1917	1918	Change in Quantity	Change in per Cent	1919	Change in Quantity	Change in per Cent
Crude products, barrels	329,000,000	355,000,000	+26,000,000	+7.9	380,000,000	+25,000,000	+7.0
Crude imports, barrels	30,000,000	37,500,000	+7,500,000	+25.0	55,000,000	+17,500,000	+46.6
Gasoline products, gallons	2,729,000,000	3,570,000,000	+841,000,000	+30.8	3,900,000,000	+330,000,000	+ 9.2
Kerosene, gallons	1,602,000,000	1,825,000,000	+223,000,000	+13.3	2,315,000,000	+490,000,000	+26.6
Gas and fuel oil, gallons	6,288,000,000	7,321,000,000	+1,033,000,000	+16.4	7,800,000,000	+479,000,000	+ 6.5
Lubricating oil, gallons	721,000,000	841,000,000	+120,000,000	+16.6	835,000,000	−6,000,000	−0.7

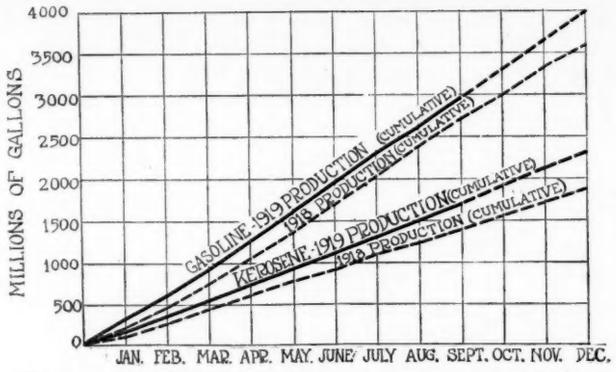


Fig. 5—The trend of gasoline and kerosene production in 1918 and 1919

sene output. The exports of kerosene in 1919 approximately doubled those of 1918, whereas the foreign shipments of gasoline during the past year fell off nearly a third as compared with 1918.

The general situation as regards kerosene and gasoline may be expressed in other terms by saying that the demand for kerosene in 1919 overtook supply, whereas, the demand for gasoline failed to quite keep pace with the capacity for producing this product. These circumstances are reflected in the fact that the average price of gasoline remained practically stationary throughout 1919, whereas kerosene showed one of the most marked advances in its history.

Use of Fuel Oil

Fuel Oil—Fuel oil, just yet, is of little direct interest to the automotive industry, since the heavy-oil engine has not come into vogue in the United States; but fuel oil concerns the automotive industry indirectly, inasmuch as this product is the source of considerable cracked gasoline, and the advantage with which fuel oil can be sold has some bearing upon the course of prices as regards its joint products—gasoline, kerosene, and lubricating oil.

During 1919, fuel oil (including a special variety used in the manufacture of gas and called gas oil), increased but slightly over 1918. (See Fig. 3 and table). The course of fuel oil closely paralleled that of gasoline; both suffered from a demand which failed to sustain its pre-armistice rate. Fuel oil, however, recovered itself in late 1919, stimulated by winter and the breakdown of the coal industry; in regard to price trend, also it departed from parallelism with gasoline, slumping off badly during the greater portion of the year, only to mount sharply in November and skyward in December.

During the year, the shift from coal to oil in industry, which was so strongly stimulated during the coal shortage of 1917-18, went on apace, at the same time that the marine demand for fuel oil underwent accelerating development. These tendencies may be expected to have a growing interest for the automotive industry, since they are registering their claims ahead of automotive transportation.

Lubricating Oil—Lubricating oils are manufactured in almost endless variety, but a large proportion of the output is devoted to automotive lubrication. As motor-oil is not differentiated from lubricating oils in general by any of the official statistical sources, this section will deal with motor-oil only by indirection.

The output of lubricating oils in 1919 showed practically no change over 1918, although in the latter year an increase of 16 per cent was in evidence. (See Fig. 3 and table). Since lubricating oil is manufactured from only a portion of the crude petroleum consumed, the rate of change in the output of this product has less economic significance to the automotive industry than is true of a product such as gasoline, which enjoys no slack in respect to its raw material source.

The character and price of lubricating oil are of more direct concern to automotive transportation, however, and during the past year the supply has tended to come into somewhat better adjustment with the fuel used, although the matter of crank-case dilution has not ceased to be troublesome. The price of lubricants fell away somewhat from the levels attained at the end of the war, although the marked advances in the prices of crude petroleum that came into evidence in late 1919 had their due effect upon lubricants, especially those manufactured from Pennsylvania crudes.

Effective November 25, the Governmental specification for lubricating oils were freed from all restrictions as to gravity, thus enlarging the raw material scope for the manufacture of lubricants for Government purchase.

The Motor-Fuel Problem

One of the notable developments of the year was the progress attained in the direction of coöperation and coördination between the oil industry and the automotive industry. This outcome received its main stimulus from two sources: the February meeting of the Society of Automotive Engineers in New York, with a special session devoted to fuel, at which a number of specialists presented analyses of the fuel supply; and the establishment of the American Petroleum Institute, which gave a centralized voice through which the oil industry, as a unit, might speak.

As a direct outcome of the February meeting of the Society of Automotive Engineers, an Automotive Fuel Committee was established, composed of representatives of the Government, the Society of Automotive Engineers, the National Automobile Chamber of Commerce, and the Motor and Accessory Manufacturers' Association, which became, for the time being, the official spokesman of the automotive industry in fuel matters.

On August 21, in New York, representatives of the automotive industry tendered a dinner to representatives of the oil industry, which was followed by a conference on ways and means for effecting better coördination between engine and fuel. A resolution was drawn to the effect that the fuel supply was changing in character, but that it was important to keep track of the change and forecast its course in the interest of better utilization of the fuel supply. The resolution also called for a listing of the difficulties encountered by the automotive industry in using present-day fuels, which led to a formulation of a reply by the Automotive Fuel Committee. These interchanges of ideas were followed by further conferences between the representatives of the oil and automotive industries, and in the meantime elaborate plans were started for establishing a Division of Research and Statistics of the American Petroleum Institute, with a program giving conspicuous place to problems of fuel utilization.

These developments have been reviewed at this length because they are thought to represent features of outstanding interest, both to the oil industry and the automotive industry. The supply of fuel is one of the controlling factors in the growth of automotive transportation, and these initial efforts toward establishing a basis of mutual interest on the part of the fuel-producing and fuel-consuming industries, not only argue well for increased efficiency in the utilization of the country's supply of motor-fuel, but also represent constructive action of a kind that does great credit to American industry.

An intimate relationship exists between the prices of crude petroleum and each of the main petroleum products,

although the conditions within the American oil industry are such that of late fluctuations in price have not materially affected the price of gasoline. The relative stability of gasoline in the past two to three years is due to the fact that changes in the market value of other petroleum products have accommodated advances in the costs of crude and refining.

The Trend of Prices

The trend of prices since 1913 in respect to gasoline, kerosene, and fuel oil is shown in Fig. 6. Since prices in the petroleum industry have shown marked fluctuations in the last quarter of 1919, an average for the year, as noted in the chart, is apt to be misleading, if used for purposes of projecting the trend into the future.

To give the average trend of prices in graphic form would involve a special investigation beyond the scope of this review, but the following statement may afford a sufficient view. Crude petroleum has remained stable throughout most of 1919, with the exception of a decline in some fields near the first of the year and a marked and practically universal advance toward the end of the year. No changes of note have taken place in the price of gasoline. Kerosene, on the contrary, has climbed steadily and strongly since the first quarter of the year, ending 1919 close to 50 per cent above its outset price. Fuel oil fell off strongly the first quarter of the year, traversed a deep valley the second and third quarters, and made an almost vertical ascension when the coal strike hit the country. The whole world is building up such a demand for fuel oil that either the world's production of crude petroleum must quickly increase, or else the price of fuel oil may be expected to continue on a high level. Lubricating oils, in the main, have tended to show a gradual decline in price over most of the year, but with an upward response of late to the rising trend in crude oil prices.

On the whole, it may be said that price developments in late 1919 were much at variance with the general run of prices during the preceding portion of the year, and that 1920 will be introduced by a higher level of prices for most of the petroleum products than has prevailed in the immediate past. This circumstance may be able to hold out promise of continued stabilization in the price of gasoline, at least so far as the first half of 1920 is concerned.

Conclusions

The outstanding developments during the year, of interest to the automotive industry, may be summarized as follows:

(a) The maintenance through 1919 of the 1918 rate of increase in the domestic production of crude petroleum.
(b) A tendency to over-produce gasoline in the face of a slight lag in demand.
(c) The tendency of kerosene to approach a motor-fuel price and its response in output to the opening up of foreign markets.
(d) A continuation and acceleration of the shift from coal to fuel oil in industry, with a remarkable price advance during the coal strike.
(e) Progress toward coördination between the fuel-producing and fuel-consuming industries.
(f) The marked price fluctuations of late 1919, affecting practically all oil products, excepting gasoline.

Selected Bibliography

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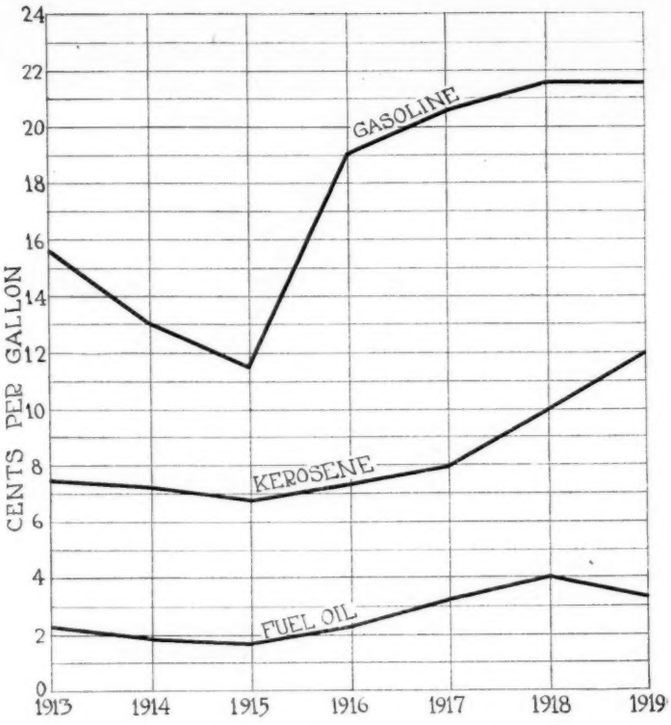

Fig. 6—The average wholesale price of gasoline, kerosene and fuel oil in 1913-1918, *with estimated projection for* 1919.

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White, David.
The unmined supply of petroleum in the United States.
Journal Society of Automotive Engineers, May, 1919, pp. 361-363.

THE Women's Bureau has prepared a report based upon a survey just completed showing that the Federal Government pays men more than women for the same or comparable work.

Iron, Steel and Non-Ferrous Metals—a Market Retrospect and Prospect

It is with much satisfaction that we present this study of metals essential to the automotive industry from a market standpoint. It is admitted that the usual form of such a study for a market review or a statistical issue is in figures, but in this case the writer explains why he does not this year use figures extensively, and likely you will agree with him.

By William Crawford Hirsch *

IN ordinary years it sufficed to place in the hands of the consumer of iron, steel and other metals as compass for his purchases in the new year a record of the prices and production in the one ended. Comparing these with performances of the market in the years that had preceded, he was enabled to formulate his buying program on the basis of historical facts which, while not always an absolutely dependable guide, formed at least a rational basis for his policies. But in the year from which we have just emerged, the iron and steel, no less than the non-ferrous metal markets, sailed an unknown sea.

For the high pressure strain to which the war's demands had subjected them, they had, in a measure at least, been prepared by the equally abnormal demand that emanated from the war offices of our associates in the war and which had preceded our joining them as belligerents. We knew what England had done to make her blast furnaces, foundries and rolling mills yield the greatest possible amount of war material, and relatively little difficulty was encountered by our steel and metal industries in accommodating themselves to the War Industries Board's regulations, the latter body having had the advantage of the example of the British regulations which it could adapt to American conditions and even improve upon. But the armistice halted war work, as suddenly across the Atlantic as it did here, and we did not have the benefit of the experiences of others in helping us over the reefs and shoals.

Figures Do Not Explain

And so we set out on this ocean of uncertainties with stout hearts, but when we behold now in retrospect what has actually happened, we are, above everything else, impressed with the utter futility of the ordinary statistical procedure for the purpose of recording the price fluctuations of the year, and even less serviceable are the methods of yester-years for arriving at a sane estimate of the future on the basis of comparisons between the values that were chalked up in the year just ended and a ten or twenty year period preceding it.

The dollar of to-day has very little in common with the dollar of 1910. Bearing in mind that money is nothing but a medium of exchange, let us recall that ten years ago a ton of pig iron (then selling at an average of $15.55) would have "bought" 16 bushels of wheat (then selling at 96 cents a bushel). To-day, putting the price of pig iron at $36.00, it would take 11 per cent more pig iron than it did then to buy 16 bushels of wheat (now selling at $2.50 a bushel). Taking the price statistician's only tool, the dollar, as gage, we would have to say that pig iron has advanced more than 130 per cent since 1910 when, as a matter of fact, taking wheat or for that matter any other food or clothing staple as a price determinant, its value has diminished more than 10 per cent. When it is remembered that even in the short span of time comprised within the year 1919, commodity prices have advanced from 18,5348, Bradstreet's index number on January 1, to 29,1756, the index number on December 1, an upward change of almost 60 per cent, it will be all the better recognized that statistics expressed in dollars and cents furnish a very insecure key to the situation.

What statistics are given in this article with reference to prices are therefore to be looked upon merely as a matter of record and orthodox custom. With prices of the immediate past eliminated as dependable sign posts to the road of to-morrow, prevailing conditions and such information as is available regarding the supply that may be expected in 1920 must serve as a basis for a survey of what the purchasing agent and automotive designer may look for from the iron, steel, and metal markets in 1920.

Legacy of the War

At the very outset of this review, one of the war's legacies to the automotive industry must be given due mention. As the result of the Government's large and varied demand for alloy steels of all kinds, not only has plant capacity for their production undergone tremendous expansion, but we have also to-day in the United States an army of metallurgists who have specialized in the production of alloy steels and are therefore well equipped by experience to promote the solution of the technical steel problems of the automotive industry which is by far the greatest consumer of these combinations of non-ferrous minerals with steel.

Even five years ago alloy steels were looked upon as a novelty, in many instances as a curiosity. To-day expansion in the manufacture of ordinary carbon steel is unimpressive compared with the rapid forward strides in the number of plants and the individual outputs of alloy products. It would seem as though ingenuity had a wider field for making itself felt in the manufacture of alloy steels, and this opportunity has attracted not so much capital as it has the best brains in the steel industry. It is a field that affords the widest scope for the display of technical brilliancy, a role in which the American steel maker is at his best.

Moreover, the steady increase in the number of electric furnaces has fostered precision in steel making to such

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an extent that qualitative demands made upon the industry have grown immeasurably and, to the credit of the steel makers be it said, fulfillment of these demands is almost invariably the rule.

In stating that the electric furnace must be recognized as one of the most potent influences in the technical betterment of steel, no disparagement of the other methods of steel production is intended. Steel castings and ingots made by the open hearth, converter, or crucible process have been benefited by the stimulus given to competition for the laurels of highest steel quality which ensued *rather simultaneously with* the increase in electric furnaces than *as a result of* their advent. Co-operation of the steel maker with the automotive industry in putting the greatest possible strength into metal used for those parts that are subject to the greatest strain, is after all the most valuable technical liaison between the two, and in this direction the metallurgical and physical laboratories of steel plants have scored astounding advances in the year just ended.

The art of micrography in steel making has been brought to a point where it has become the real handmaiden in the detection of weak spots and their elimination either in the mass or in the successive stages of conversion. May the foregoing suffice as a summary of the high lights of 1919 and as introductory to a more detailed consideration of the various commodities which the automotive industry draws from the realm of iron, steel and metals.

Pig Iron

The vagaries of the year 1919, with hopes running high one day that production and consumption would set new records, only to be blasted on the morrow by some one of the many industrial or economic disturbances, are eloquently exemplified by the pig iron output and the course of values for that basic commodity. In January the rate of annual production was estimated at more than 39,000,000 tons. By May expectations had shrunk to 25,000,000 tons as the 1919 output. Increase in production in July and August caused hopes to rise again and on Sept. 1 a yield of 30,000,000 tons was looked for from the blast furnaces. Then came the steel strike, followed by the coal strike and, as a result, production in October fell below 2,000,000 tons. The year closes with a production estimated at below 30,000,000 tons.

This compares with an average production of approximately 39,000,000 tons during the three preceding years, a shrinkage of 23 per cent. To a large extent this loss in output is to be ascribed to conditions that, let us hope, are not likely to repeat themselves, such as strikes affecting both operations at the furnaces as well as the supply of ore, but a study of the daily output, which, from more than 100,000 tons in January, had fallen to below 70,000 tons in May, shows all too clearly reduced efficiency of the average blast furnace worker.

During the first half of the year, the output of the chief grades of non-steel making iron, i. e., foundry, malleable, and forge, aggregated 3,323,675 tons, constituting somewhat in excess of 20 per cent of the entire output. Retaining this as a basis for the entire year, the output of non-steel making iron was probably around 6,000,000 tons, and of this tonnage around 5,000,000 tons were foundry iron, which quantity is only slightly below the foundry iron output we have been accustomed to for several years.

Examining the movement of the foundry iron market, we find that at the year's opening the average price was $31 a gross ton which constituted a decline of about 9 per cent from the price levels in vogue during the closing days of control by the War Industries Board. In March the Industrial Board of the Department of Commerce, following conferences with producers and in apparent agreement with them, announced a horizontal price cut of $4.25 a gross ton, bringing the market's average to $26.75 at which level it remained until the steady shrinkage in output caused consumers to compete more briskly with one another for supplies, a condition that began to make itself felt at first moderately in October and which became more and more pronounced as transportation and fuel supply were jeopardized through the labor disturbances of the last quarter of the year. As a result of the intensive rivalry for pig iron supplies between foundries, the close of the year finds prices at the highest level of the year, averaging $40 and denoting advances of nearly 50 per cent from the year's lowest and of 29 per cent from the year's initial price.

It would seem as though, because of their anxiety to cover their future requirements of foundry iron, consumers had already brought about a market condition in which prices may be said to have anticipated the scramble for supplies. In these days of incertitude regarding the labor market, it is difficult to make any estimates as to the future production of any commodity, no matter how urgent the demand and how readily available the raw material.

But, in so far as the eye can see at this writing and always allowing for sudden shifts in the price barometer as a whole, the market for foundry iron faces in 1920 a steady striving to regain a normal output and, as values at the present are the creation of a sharp preponderance of demand over supply, adjustment eventually must lie along the road of easier conditions for the buyer.

Steel and Steel Products

Under the intelligent leadership of the chief producers of raw steel, a sound program for the gradual readjustment of the steel industry from a war to a peace basis was evolved early in the year. The principal producer, once price readjustments on a lower scale had been put into effect, refused to be carried off his feet by momentary contraction in mill output or by the periodically recurring clamor from consumers for preferred deliveries of steel accompanied by offers of higher prices or premiums to which they had become accustomed during the war. But the leaders of the steel industry, perceiving clearly that the road to health for the steel market could be made secure only through as energetic stabilization of prices as possible, turned their faces resolutely against the temporary advantages they might have gained when, toward the year's close, the steel strike, and later the coal strike, caused a veritable stampede among consumers eager for steel and steel products at any price. As it was, prices responded to the impaired supply but, had it

No. 2 Foundry Iron

(1919 *average price per gross ton*)

Jan.	Feb.	Mar.	April
$31.00	$31.00	$31.00	$26.75
May	**June**	**July**	**Aug.**
$26.75	$26.75	$26.75	$26.75
Sept.	**Oct.**	**Nov.**	**Dec.**
$26.75	$27.00	$29.00	$36.00

Steel Billets

(1919 *average price per gross ton, Pittsburgh basis*)

Jan.	Feb.	Mar.	April
$43.50	$43.50	$43.50	$38.50
May	**June**	**July**	**Aug.**
$38.50	$38.50	$38.50	$38.50
Sept.	**Oct.**	**Nov.**	**Dec.**
$38.50	$38.50	$38.50	$42.50

Sheets; No. 28 Black

(1919 *average price, cents per lb., f.o.b. Pittsburgh*)

Jan.	Feb.	Mar.	April
4.70c.	4.70c.	4.70c.	4.35c.
May	**June**	**July**	**Aug.**
4.35c.	4.35c.	4.35c.	4.35c.
Sept.	**Oct.**	**Nov.**	**Dec.**
4.35c.	4.35c.	4.35c.	4.35c.

not been for the repeated announcement of the most prominent producer that upward revision of prices would be avoided, if it could at all be circumvented, there would have occurred several times during the year runaway market conditions which would have seriously inconvenienced consumers and the reaction from which might have been fraught with disaster for the industry as a whole.

Taking billets as a criterion for the market for unfinished steel, we find that they opened the year with the average quotation for January in the Pittsburgh market at $43.50. This condition continued throughout February. On March 20, the Industrial Board of the Department of Commerce and representatives of the steel industry reached an agreement under which a horizontal reduction of $5 a ton was promulgated in the price of all unfinished steel, bringing the quotation down to $38.50 a gross ton. It will be remembered that the object of this price reduction was to bring about the speedy return of industrial activity.

The Railroad Administration was to set the pace by placing orders with the steel mills for heavy tonnages of rails, but on April 2, 13 days later, the Director General of Railroads made it known that he would not place any orders at the prices agreed upon and the market was once more left to shift for itself. The prices announced by the Industrial Board remained, however, in operation and applied practically to all transactions up to the middle of November, when the effect of the deficit caused in production by the strike began to make itself felt more and more, causing gradual advances which toward the end of December led to a $48 price for billets, a 25 per cent advance over the lowest level of the year and exceeding by 10 per cent the year's opening price.

Significant from the purchasing agent's point of view is the fact that last January, when, in spite of declining production, light demand and failure of inquiries from the construction trades to materialize caused the industry to have a spell of the "blues," it was activity in the automobile trade that gave fresh courage to steel producers. It was such news as that production of a popular priced passenger car had reached 1000 machines a day and was shortly expected to reach 3000 that helped the steel market over the roughest spots of the road. The new year opens amid very much the same conditions. Steel buying for building purposes is still in abeyance. Export trade is retarded by untoward exchange conditions. The one bright lodestar in the firmament is the demand from the automotive industry, already buoyant and expected to grow more so from day to day, with sellers of steel especially gratified by the impressionable increase in orders emanating from the builders of motor trucks and tractors.

Price movement of steel products during the year was also featured by the reductions originated by the Industrial Board of the Department of Commerce. In sheets they amounted to $7 a ton. Black sheets started the year with a quotation of 4.70c a pound for the No. 28 gage and, as the result of the Industrial Board's cut, were quoted late in March at 4.35c at which price level they remained stationary until the end of the year. The same permanency of prices characterized other sheet products, largely due to the policy of the chief producing interest to hold prices in check during the year. In view of the fact that the basic material from which sheets are rolled as well as fuel and labor have appreciated considerably, while sheet values remained unaltered, the somewhat incongruous position of this commodity furnishes food for the thinking purchasing agent's mind and this, in spite of the fact that during the last quarter of the year it happened frequently that buyers who were urgently in need of material, offered premiums of $2 to $5 a ton on sheets. In fact, early in November as high as $30 a ton premium was reported to have been offered by one automobile builder for automobile body sheets. This practice of offering premiums for prompt deliveries, it might be argued, could only prevail in a market in which the supply is distressingly short. But it is not unusual for steel consumers to overestimate the scarcity of the article they are unable to obtain from their regular source of supply.

One automobile builder might be encountering seemingly insurmountable obstacles to replenish his supply of automobile sheets while nine others are so well supplied that they scoff at reports of premiums being paid. Automobile sheets in consumers' hands might be plentiful on the whole and production above normal. At the same time this or that consumer could not obtain much needed supplies simply because of the contract obligations on the part of mills toward other consumers.

In judging the market's future, it would seem advisable to base opinions on the quotation for sheets rather than on ephemeral premiums, of which quotations took no cognizance. Reports of such premium payments for prompt shipments cause quotations to be looked upon as nominal for the fleeting moment but, with few exceptions, premiums, when not translated in the course of a few weeks into price advances, reflect solely the predicament of individual buyers and not a lack of supply on the whole.

The leading producer apparently believes that the differential between the price of sheet bars and rolled and finished sheets allows an adequate price for the production of the latter at the prevailing quotation. Possibly this or that consumer may rail at the unmeaningness to him of this quotation because the producer's capacity is preempted by existing contracts. But rather than take this attitude, he could with much advantage to himself learn that one of the fundamentals in steel buying is that "the early bird catches the worm." It is appreciation of the

truth of this homely adage on the part of the consumer upon which those honestly striving to stabilize prices, must in a large measure depend for consummation of such a steadying of values which is predicated upon the placing of contracts sufficiently long in advance to insure adequate deliveries at all times, thereby eliminating periodical gaps in the supply and the necessity for offering premiums.

Alloy Steels

Reference has already been made to the ascendancy of alloy steels which has become the most impressive characteristic of the post-war record of the industry. In 1918 production of alloy steels was placed by the American Iron and Steel Institute at 1,787,852 tons, the major part of which represented war requirements. It is quite possible that, when the returns for 1919 output are available, the figures will prove disappointing, because the strikes hit no one harder than the alloy steel specialists. Little significance need be attached to this.

Everyone in the industry knows that demand for alloy steels has grown by leaps and bounds and, as production is to a large extent in quarters other than those that are wont to report their output minutely, statistics are likely to be found misleading for some time to come. Similar difficulties are encountered when one essays to arrive at an estimate of consumption. This is especially true with reference to the automotive industry. The National Automobile Chamber of Commerce in a report to the War Industries Board stated that the average automobile requires 100 pounds of alloy steel. Based on a 1919 production of, say, 1,600,000 cars, this would imply a consumption of only 72,000 tons of alloy steel by the automobile industry in that year. This quantity falls so obviously short of the amount of alloy steel absorbed by the automotive industry that the average of 100 pounds alloy steel to a car may be put down as an obsolete estimate. Nor must sight be lost of the steadily growing quantities of alloy steels absorbed in the manufacture of motor trucks and tractors, the requirements of which important branches of the automotive industries were not embraced in the estimate referred to. Placing the annual output of motor trucks and tractors at 500,000, which is a very modest estimate, it will be readily seen that the tonnage of alloy steel entering into their production is of considerable proportions. That this tonnage is certain to increase from year to year is assured by the industry's constant efforts to lessen the weight of these motor vehicles without impairing their strength, durability and capacity. Progress along these lines lies largely in the use of more and more alloy steels and the ensuing displacement of bulk by the athlete-like qualities of such minerals as molybdenum, the use of which in steel is reported to have permitted the twisting cold of an axle six times without revealing signs of fracture.

It is not in quantity production or consumption that the alloy steel output is significant. It is the steadily growing variety of steels, each especially adapted to the purpose that it is to serve, that we find the real explanation for the steadily growing importance of alloys.

Because nickel enters so largely into the manufacture of automobile steel, it may be considered here rather than under the head of non-ferrous metals entering as separate commodities into the construction of automobiles. The price of electrolytically refined nickel at the opening of the year was 40 to 45 cents. This range remained operative until the second half of the year when the price gradually narrowed down to a flat 45-cent quotation. The production of this metal being closely concentrated, values have always reflected much more permanency than those for metals subject to speculative fluctuations.

Nickel is frequently used as a steel alloyant in conjunction with chromium. Chrome ore has shown a downward tendency throughout the year, and in its closing days is quoted at 70 to 80 cents, compared with as high as $1 during the summer.

The same easing tendency has been in evidence in tungsten and its ferro-alloys. Wolframite and sheelite, from which tungsten is obtained, opened the year at $19 to $19.50 per unit. The decline in prices was gradual until at the year's close we find the market weak at a range of $7 to $9. Reflecting the decline in the basic mineral, ferro-tungsten sold down from the opening quotation of $2.35 to $1.10 at the year's end. The quotation for ferro-vanadium has been maintained steadily throughout the year at $6.

Molybdenum alloys followed closely the course of tungsten, ferro-molybdenum opening the year at $4 and being held at $2.25 to $2.50 at the close. Ferro-silicon and ferro-manganese have been used for so many years in steel making that they are really not meant to be included when the latter-day growth of alloy steels is spoken of. Ferro-manganese opened the year at $240 to $250 for domestic, and following ups and downs, in which the latter predominated, the year's close finds values at just about one-half of what they were at the outset, namely $120. Ferro-silicon, which sold at $140 to $150 early in the year, is now obtainable at $80 to $90.

While, because of the relatively slight quantity of these alloys used in a ton of steel, their price movement may appear to be of subordinate influence on the price of finished alloy steel as compared with the effect of a rise or fall in the price of pig iron and coke, observation of the course of the market for ferro-alloys will prove a remunerative study for the purchasing agent because of its foreshadowing very frequently the trend of prices for alloy steels, and to the designer it will reveal what the tendency in steel specifications is.

The future of the market for many of the minerals that go into the manufacture of ferro-alloys is wrapped up in the tariff legislation of the next few years. During the war, domestic production of tungsten and a number of other alloying minerals was fostered through the abnormally high prices that prevailed. Since the signing of the armistice domestic producers have in many instances been put out of business by the price levels that resulted from diminished demand and from a return of foreign competition freed from war regulations. Agitation to encourage and fortify home production through adequate tariff protection is now being carried on and will grow more and more strenuous as Congress prepares for general tariff revision.

A review of the year's history of the steel industry would not be complete without mention of the battle over "f. o. b. Pittsburgh" or the Pittsburgh base for steel prices which opened in November and the end of which is not yet. As far as Detroit consumers and those in the vicinity of that automotive center are concerned, their interests are but little affected no matter what the outcome of the controversy may be, for the simple reason that the "f. o. b. Pittsburgh" base is an actual one in their purchases from steel mills, at least in the preponderatingly large number of shipments.

Different it is with automobile plants in the Chicago territory and west of that city. The Calumet steel region has the advantage of being closer to the iron ore supply, but when the Middle West consumer buys steel products turned out at Gary or South Chicago he finds that he must pay the Pittsburgh price plus the freight charge per ton from Pittsburgh to the point of destination, even though the steel may actually call only for a fifty-mile haul from mill to consumer's works.

From September, 1917, to July, 1918, Chicago was made

a basing point, but then "f. o. b. Pittsburgh" was restored as base. As in all such controversies, there are two sides to the story. Price equalization is helped through the time-honored "f. o. b. Pittsburgh" basing system, but consumers within close proximity to Western mills, who are called upon to pay freight from Pittsburgh on deliveries of steel from a point of shipment only a few miles distant, are naturally in favor of doing away with the present system. At all events, it will be well for purchasing agents to take into consideration, when placing contracts for long-deferred deliveries, the possibility of a change in this direction.

NON-FERROUS METALS

Aluminum

It is not because of its alphabetical precedence that aluminum is given first place in the following summary of the year's events in the non-ferrous metal markets. Aluminum has become the most important of the non-ferrous metals to the automotive industries. The National Automobile Chamber of Commerce made no mention of aluminum in its report to the War Industries Board in 1918.

The average copper contents of an automobile are given in that report as 36 pounds. On the basis of a production of 1,600,000 cars a year, this would make the copper consumption in the automotive industries 57,600,000 pounds a year.

The sole producer of virgin aluminum in the United States, on the basis of accurate calculations covering sales for several years, places the consumption of aluminum by the American automobile industry at 40 per cent of the total consumption, which amounts to about 200,000,000 pounds a year, or 80,000,000 pounds. So that in spite of the conventional precedence which copper has over other non-ferrous metals in reviews like this one, the priority accorded to aluminum is justified by the much greater consumption of that metal and the steady growth of its importance in the automotive industries. And here, too, must be taken into account the tendency to lessen the weight in motor trucks and tractors. For the time being, consumption of aluminum in these may be relatively light, but eventually designers, striving to save weight at all costs, will resort here, too, to the use of aluminum for this or that part, if by doing so the goal of lightness without lessening strength can be obtained.

Expansion of aluminum consumption in automobile building furnished to the market for that metal the bridge which enabled it to cross with safety the transition period from war to peace conditions. As the result of war demand's pressure, production was increased from around 90,000,000 pounds in 1915 to more than 200,000,000 pounds in 1918. Moreover, the Government's requirements, after we entered the war, were such that it practically monopolized the entire supply, with the result that aluminum had to be withheld from many consumers whose products were non-essential. With the signing of the armistice it became necessary to re-educate those whom it had become imperative to wean from the use of aluminum during the war. In the automotive industry this was relatively easy, because the advantages of aluminum, affording lightness and tensile strength, were thoroughly understood by designers and engineers.

Price fluctuations during the year were unimportant. Contract prices remained throughout the year on the basis of 33 cents a pound. In the so-called "outside" or resale market the quotation for virgin ingots dipped at one time as low as 28 cents, but for the major part of the year metal held by others than the sole American producer sold at prices very close to the latter's contract price. The same stability of prices was in evidence in the market for aluminum sheets and alloys.

The cause for the short-lived recessions in the "outside" market was to be attributed in the main to offerings of Government surplus holdings and exaggerated reports of impending arrivals of foreign aluminum. In October reports were freely circulated that French aluminum in heavy quantities was to be unloaded in this country. When shipments from that country did begin to arrive it was found that they were of insignificant proportions and that the selling representatives in this country of the foreign aluminum producers, far from being in a mood to undersell the American consumer, were not disposed to commit their principals for more than very limited amounts and only at positively full prices.

In fact, imports throughout the year were not more than around 1000 tons, compared with an average of 10,000 tons annually in 1912, 1913 and proportionately during that part of 1914 which preceded the outbreak of the war in Europe. Just as false rumors were set afloat last summer that importations would be heavy, so there were circulated toward the middle of December equally unfounded reports that the French Government had placed aluminum under export embargo.

The truth of the situation is that for the present none of the European aluminum producers is in a position to offer very much metal abroad, and that the productive capacity of the sole American producer of virgin metal has grown to such proportions that he is able under ordinary conditions to do full justice to the demand.

That during the year 1919 it was frequently a very close race between the supply and demand was due to abnormal causes. At one time a strike at the Massena plant interfered with operations; then considerable difficulty was encountered in obtaining adequate shipping facilities for foreign bauxite; and the difficulties arising out of the coal strike and the general labor situation, from which no industry was immune, aggravated the troubles of the producer and enhanced the amount of energy required to maintain the flow of metal from the refineries to consumers' plants.

Due to the straits in which European producers find themselves as the result of economic conditions in their respective domains, it looks very much as though they would have their hands full to supply their domestic demand and that of the markets which are naturally tributary to them. The American producer, moreover, is well equipped today to satisfy all demands and to keep pace with their growth. Mining of high-grade bauxite in the Guianas is steadily expanding and additions to transportation facilities for this material are being constantly made.

The price policy of the American producer has always been directed toward increasing the consumption of the metal in the automotive industries as much as possible. With competition from foreign sources reduced to a minimum, the only change in price from the contract quotation of the producer in the "outside" market can come through offers of premiums by consumers who have not adequately provided for their requirements and are therefore unable to obtain additional tonnages from the source of origin at the time they want them, or through consumers turning sellers of metal, which latter condition is most always responsible for declines in the resale market.

Aluminum

(1919 *average price in cents per lb. of virgin ingots, 98 per cent pure, in open market*)

Jan.	Feb.	Mar.	April
33.00c.	33.00c.	31.50c.	30.00c.
May	**June**	**July**	**Aug.**
31.50c.	33.00c.	33.00c.	33.00c.
Sept.	**Oct.**	**Nov.**	**Dec.**
32.75c.	32.75c.	32.75c.	32.75c.

Electrolytic Copper

(1919 *average price per lb. in cents*)

Jan.	Feb.	Mar.	April
21.50c.	18.50c.	15.00c.	15.25c.
May	**June**	**July**	**Aug.**
15.00c.	16.25c.	19.00c.	22.50c.
Sept.	**Oct.**	**Nov.**	**Dec.**
22.25c.	21.25c.	20.75c.	18.75c.

So long as there is, however, ready demand for every pound of aluminum that is produced, the "outside" market is likely to be famished for supplies. Quantitatively speaking, it is at best a stop-gap. Compared with the prices that prevailed at the close of the year for most steel products, aluminum shows a much slighter rise over pre-war levels than the former.

Sheet bars in 1914 sold at an average of $21 a ton. The closing days of the year 1919 saw sheet bars selling at $51, an advance over the pre-war price of 143 per cent. Aluminum in 1914 sold at an average of 18 cents, so that the closing price of 1919, i. e. 33c, represents an increase in price over the pre-war days of only 85 per cent. The contract price for 1921 will undoubtedly be based on whatever change in economic conditions makes itself felt between now and the time that 1921 business is to be placed.

These considerations will exert, however, a like influence on all other commodities, and so the relative cheapness of aluminum should be maintained, due, as it appears to be, not to the vagaries of crisscross currents in a wide-open market, but to the progress made in production methods.

Copper

Copper's price début in 1919 was at 21.50c for electrolytic. From the very outset the market fell under the weight of heavy holdings by the Government as a legacy from the war. Values drooped and by the end of February had declined to 15.25c, with metal for April shipment then offered at as low as 14.50c. On Feb. 1 stocks of refined, blister and scrap copper were estimated at 1,300,000,000 pounds. Of this tonnage about 600,000,000 pounds were refined, including Government owned stocks.

At the very beginning of the year producers bent their energies toward reducing output, and by March 1 a curtailment of 40 per cent had been achieved. Toward the end of March the War Department announced approval of an agreement made with the copper producers under which the Government's surplus was to be disposed of through the producers. The agreement provided for the sale of the Government stocks in monthly instalments of a tonnage equal to 10 per cent of sales made by the producers on their own account, providing that at least 5,000,000 pounds of Government metal should be sold each month during the first ten months and that at least 10,000,000 pounds monthly should be disposed of during the following five months, a period of fifteen months in all in which to dispose of the entire amount.

April marked the culmination of the greatest depression in the market. The producers disposed of the Government surplus long before the time that had been allotted to them, due to improvement in the demand, which gradually lifted prices to the 22c level in August. From then on prices began to sag again, as the result chiefly of a lack of export demand, due to the disorders in the exchange situation. In fact, the periods when hope ran high that the peace treaty would be ratified by the Senate marked the ups, and disappointment in that expectation the downs of the copper market.

Producers had pinned their faith in the early revival of trade with the Teutonic powers, formerly one of their best outlets, and as it became more and more obvious that Germany encountered insurmountable difficulties in financing her industrial requirements, the market for the red metal became more and more of a dreary affair. Following short-lived spurts of activity, the market toward the closing days of November relapsed into a condition of coma in which it was impossible to move metal into consumers' hands even at the low price of 18c.

Toward the end of December a slight improvement manifested itself, and producers, fearful that the host of speculators who had been attracted to the market by the low price levels might come into possession of tonnages sufficient to disturb the market at some future time when things looked brighter, put up the bars and confined their sales to regular consumers. At the close of the year there are two markets, one for sales by producers to consumers in which electrolytic is quoted at an average of 18.75c for early shipment, and one for sales by "outside" holders to semi-speculative interests with the current asking price at 19.25c for first quarter 1920 deliveries and 20c for second quarter.

Copper stocks on hand on Jan. 1, 1919, aggregated 742,000,000 pounds, exclusive of Government holdings and stocks in second hands. Whenever producers sought to curtail output, efficiency of mine, smelter and refinery labor thwarted the attempt to a great extent. In the days when the probabilities of an early resumption of consuming and export demand made operators desirous of quickened production, the yield lagged behind.

It is safe to say that the end of the year finds the market with not less than 750,000,000 pounds of undigested metal on hand, approximately between four and five months' production. According to a recent report of the Federal Trade Commission, average cost of production in 1918 was slightly more than 16 cents a pound. Since then production costs for most companies have risen to a point where 18 cents probably represents a level very close to cost.

From the angle of cost, therefore, the prevailing price for the red metal may be looked upon as very advantageous to the consumer. But the recent condition of the market attracted so large a number of speculative buyers

Straits Tin

(1919 *average price in cents per lb. for spot*)

Jan.	Feb.	Mar.	April
72.50c.	72.50c.	72.50c.	72.50c.
May	**June**	**July**	**Aug.**
72.50c.	72.50c.	69.50c.	70.50c.
Sept.	**Oct.**	**Nov.**	**Dec.**
55.50c.	54.25c.	52.50c.	54.00c.

that large tonnages of copper are in second hands. In the event of a modest advance in prices these holders would not be satisfied to take profits; the majority of such buyers usually want to make a "killing," and, as a rule, something happens in the meantime to blast their hopes. Then they become discouraged and liquidate at any price, with the result that their aggregate offerings can break the strongest market.

Even if Europe should buy liberally in 1920 it would seem as though a period of shortage in the supply would be well-nigh precluded. The copper market, always more or less highly speculative, is one in which consumers will do doubly well to be on their guard in 1920.

Tin

This metal, for the supply of which we depend for the most part upon countries of the Orient, remained under Government control until late in June when restrictions against the sale of spot metal were removed, and in July complete freedom of the market for importations was promulgated. Continuance of control of tin beyond the date of supervision over other metals was due to the fact that the War Industries Board had entered into a contract with the United States Steel Products Company, whereby the latter agreed to import a very large tonnage of tin from the Straits Settlements, and much of this remained unsold when the War Industries Board ceased to exist. George N. Armsby, in charge of tin control, continued therefore to exercise the functions of administrator of the war tin import monopoly, until all of the metal had been absorbed. The fixed price for Straits tin was 72.50 cents from the time that the United States Steel Products Company was appointed to act as sole tin importer in behalf of the Government. This price represented approximately actual cost to that corporation, buyers being assured of a rebate to whatever extent costs might be abbreviated at the final reckoning. This rebate buyers received shortly after control ended.

The market for Straits tin did not become an open affair until the middle of August, when prices receded first to 60 cents and later close to 55 cents. On the basis of the London and Singapore quotations, the market moved evenly up toward December, when the sharp declines in the market for sterling exchange made it possible for American importers to reduce the quotation for prompt shipment to around 54 cents in spite of sharp upturns in London tin quotations.

Meanwhile very large quantities of tin had arrived here from the East and from England, and as a result the metal's statistical position turned very easy. Chinese tin, which enjoyed great favor while the control continued, because it was exempt therefrom, was kept out of the American market in the last quarter of the year because of the high price of silver, in which metal payments would have had to be made.

Production of tin smelted and refined in the United States from Bolivian ores is steadily growing, and the resultant metal sells virtually on a parity with the best imported. The future course of the tin market appears to be wrapped up largely in the future of the foreign exchange situation. Bearing in mind what was said before with reference to the derangement of the value of money as a price indicator for commodities, it may be said that, roughly speaking, London will always expect to get three pounds of American copper for one pound of Straits tin. In the closing days of 1919 spectacular advances abroad caused the price of Straits tin here to advance to 57 cents.

Lead

The lead market started the year at 6 cents a pound. Toward the end of January the market had declined to 5.25 cents, export demand being reduced to a minimum. In 1918 production was 130,000 tons greater than pre-war consumption and, in order to bring about the necessary readjustment, production was cut to 60 per cent of the 1918 rate early in January. Further reductions in price followed with the same object in mind, i. e., to hasten readjustment on a peace basis. In February the market became a 5-cent affair and then see-sawed until in June a decided reaction set in, with the result that gradual advances ensued that brought the market toward the middle of December to 7 to 7.25 cents a pound, New York basis.

Lead producers suffered during the second half of the year from the general ills of the industrial body, labor disturbances at their own properties, shortage of fuel at their smelters, and, in addition, ores that would ordinarily come here from Mexico were diverted to Europe by more favorable exchange rates. Curtailment of output earlier in the year resulted in a positive shortage of the supply in the last quarter, and reports that building activity would be one of the features of 1920 caused a quickening of the demand from industries catering to the construction trades.

Lead

American Smelting & Refining Company's (chief producers) price in 50-ton lots, f.o.b. New York

1919	Per Pound
January 21	Reduced 0.50c to 5.50c
January 31	Reduced 0.25c to 5.25c
February 7	Reduced 0.25c to 5.00c
February 20	Advanced 0.10c to 5.10c
February 25	Advanced 0.15c to 5.25c
April 9	Reduced 0.25c to 5.00c
May 16	Advanced 0.10c to 5.10c
May 19	Advanced 0.15c to 5.25c
June 11	Advanced 0.15c to 5.40c
July 14	Advanced 0.10c to 5.50c
July 18	Advanced 0.25c to 5.75c
July 24	Advanced 0.25c to 6.00c
September 15	Advanced 0.25c to 6.25c
October 16	Advanced 0.25c to 6.50c
October 23	Advanced 0.25c to 6.75c
December 6	Advanced 0.15c to 6.90c
December 18	Advanced 0.25c to 7.15c
December 26	Advanced 0.35c to 7.50c

Zinc; East St. Louis Basis

(1919 *average price per lb. in cents*)

Jan.	Feb.	Mar.	April
7.65c.	6.50c.	6.25c.	6.25c.
May	**June**	**July**	**Aug.**
6.00c.	6.25c.	7.00c.	7.35c.
Sept.	**Oct.**	**Nov.**	**Dec.**
7.50c.	7.00c.	7.60c.	8.25c.

Antimony; Chinese or Japanese

(1919 *average price per lb. in cents for duty paid*)

Jan.	Feb.	Mar.	April
7.25c.	7.20c.	7.05c.	6.55c.
May	**June**	**July**	**Aug.**
6.95c.	8.30c.	8.50c.	9.42½c.
Sept.	**Oct.**	**Nov.**	**Dec.**
9.00c.	9.00c.	9.00c.	9.25c.

The close of the year finds the lead market at the zenith of its strength for that period. In 1916, 1917 and 1918 the lead market rose to higher levels during the first half of those years. This could not be ascribed to unusual demand from the building industry, for there was little building in those years. In the years before the war this was not always the case, and in those years building activity was unprecedented. Wherefore it would not do to bank too strongly on a rising lead market, even though considerably quickened building activity should ensue in the days ahead of us. Much depends upon what foreign lead producers will do in 1920. The industry in Australia and in Spain has been greatly hampered by strikes. British Government war surplus is being readily absorbed. American lead producers in their 1920 prices will be guided chiefly by the world consumption of their metal.

Zinc (Spelter)

Generally unsettled conditions, together with heavy Government holdings of war surplus stock, kept the zinc market in the doldrums during the greater part of 1919. The market started its 1919 career at around 7.65 cents a pound, East St. Louis basis. Lower and lower went values, until in May the price had receded to 6 cents. Slowly, very slowly, improvement came, with 8.10 cents the high level in August. Again came a reaction, but in December recovery ensued and toward the middle of December sales were made at 8.25 cents.

At first it was reported that the Government had 75,000 tons of zinc to dispose of as the result of having contracted for more metal than was needed in the war. This tonnage was revised downward later, but continued to hang like a Damoclean sword over the market, which at best, suffers chronically from over-supply. Moreover, the Government's surplus holdings of war material included heavy tonnages of brass: around 62,000 tons, which contained an average of 65 per cent zinc or 40,000 tons. But toward the end of the year it looked as though the Government's holdings had been absorbed by buyers who, for the most part, were not consumers. Whether these Government stocks, like Banquo's ghost, will rise again to haunt the market remains to be seen. The magnet that lifted the zinc market out of the rut toward the close of the year was improved export demand. Galvanizers, whose requirements are one of the market's chief props, were seriously impeded in their operations by both the steel and the coal strike, and failed to consume their usual quota. This, however, was offset by curtailment of production at the mines and smelters, where shortage of man-power earlier in the year, and of fuel and cars for transportation later, caused curtailment in output.

The zinc market is accustomed to having 60,000 tons of undigested metal hanging over its head. It is never short of supply. When zinc sold at 6 cents earlier in the year it sold below the cost of production. At the present time it is selling at levels which allow of replacement at a fair profit to the producer. Further pronounced upward fluctuations could only come through a sudden augmentation in the export demand or some other unforeseen happening. The end of the year flurry in the market was professional and not the result of augmented consumption.

Antimony

The market for this metal, for the supply of which we depended entirely upon the Orient in 1919 (importation from England and other European pre-war purveyors not yet being resumed), moved from 7.25 cents a pound, at which level the market opened the year, to 9.62½ to 9.75 cents at the end of the year, the successive advances being due to the sharp rise in silver which featured the year 1919 and corresponding advances in the cost of labor in China and Japan.

When the silver market is again more normal a readjustment in the price of antimony may be looked for.

General Conclusions

Foundry and Pig Iron.—In general, in short supply, with no relief in sight until the opening of navigation brings fresh supplies of ore to the blast furnaces, fuel conditions are rectified and rail transportation for the finished pig is more adequate.

Steel and Steel Products.—While the market for these commodities displays outwardly a sharply rising tendency, there is no real dearth of production. Advances represent to a large extent premiums that buyers who failed to cover their wants in time are willing to pay in order to overcome the handicap of contracts having priority over their wants.

Alloy Steels.—Consumption increasing, but markets for all minerals used as alloys in easy position, which is equally true of the market for ferro-alloys.

Aluminum.—Demand from automotive industry steadily growing, but sole producer keeping pace with it. Prices featured by constancy.

Copper.—Large surplus stocks and much of these in hands of semi-speculative holders; market outlook opaque.

Tin.—Adequate stocks in American warehouses and world's visible supply apparently in buyers' favor. Price movements of future will be largely influenced by general exchange situation.

Lead.—Demand and supply nip and tuck affair; prevailing prices reflect this condition and are subject to such alterations as the future preponderance of the one over the other will prescribe.

Zinc.—Large unabsorbed surplus in spite of recent upward movement, which was of a speculative character.

Antimony.—Deflation of the silver market would result in corresponding easing off in the price of this metal.

Labor Statistics Give Definite Industrial Facts

Figures are not the result of opinions, and the facts they present are as nearly unbiased statements as it is possible to obtain. Latest labor statistics show that industrial conflict is not on the increase and that definite progress is being made toward a peaceful settlement of industrial disputes.

MORE opinions without basis in fact probably are expressed concerning labor problems and labor troubles than concerning any other subject in the public mind today. Consequently it is refreshing to dig into authentic statistical data having to do with the present labor situation with a view to learning what actually has been occurring—how many strikes there have been during the past few years, whether that number is increasing or decreasing, what the strikes have been caused by, just how many men really belong to this American Federation of Labor, about which we have heard so much in connection with every labor disturbance of late; how the rise in wages actually compares with the increased cost of living, and finally, what has actually been done toward constructively meeting the labor situation.

While undoubtedly it is true, as the old darkey remarked, that "while figures may not lie, liars do figure," an intelligent understanding of the present labor situation must, to some extent at least, be based upon statistical data. Upon this foundation of actual figures, however, must be built a firm superstructure of intelligent interpretation, for the figures cannot tell the whole story.

In most cases the best figures concerning labor are those prepared by the Bureau of Labor Statistics of the Department of Labor. The statistics of this department are usually based upon a comprehensive survey which attempts not to cover fully every portion of the field being investigated, but to study a sufficient number of typical units in typical sections to warrant the results being taken as true of the entire field.

Are Strikes Increasing in Number?

Department of Labor statistics list the following number of strikes and lockouts since 1916:

Year	Strikes	Lockouts
1916	3,678	104
1917	4,233	126
1918	3,181	104
1919 (half-year)	1,558	57

These figures show that despite the popular belief that strikes and labor disturbances have increased enormously since the armistice was signed, there actually has been no great change in the average number of strikes during the past four years. The effect of the war upon the number of strikes was negligible, the average for 1916, a pre-war year, being about equal to that of 1917-1918, the two war years. The war did no more than make the expression of strike causes more articulate. This particular set of figures, however, does not show the importance of the strikes nor the numbers involved in them. The false belief that the number of strikes is rapidly on the increase can probably be traced to the fact that the more recent strikes have occurred in large, basic industries and have consequently affected "the man on the street" in a way that a hundred strikes of a dissimilar nature would never do.

The figures for 1919 need special comment. They are not complete, even for the half year which they represent, so that a considerable number of strikes probably occurred during the first half of 1919 which are not included in the figures presented. Even supposing, however, that a considerable number of strikes be added to the total shown, and that a like number occurred during the last six months of 1919, the total for the year would still be less than the total for 1917. This general criticism of incompleteness extends to practically all of the figures for 1919 used in this article.

It is unlikely that the figures for the last six months of 1919 will show as large a number of strikes as those for the first six months. The ill-success of several important strikes, notably the printers' strike in New York and the steel strike, probably headed off a number of other incipient strikes which might have gone through had the ones already in motion met with better success.

Thus, in so far as the mere number of strikes is concerned, there is no ground for the belief that labor unrest is growing. The situation in this respect, though bad enough, is no worse than usual and should not be the cause

Exhibit 1 shows how a number of the leading industry groups were affected as to number of strikes during 1916,

Number of Strikes in the Leading Industry Groups in Which the Largest Number of Strikes and Lockouts Occurred, 1916, 1917 and 1918

Industry	Strikes			Lockouts		
	1916	1917	1918	1916	1917	1918
Building trades	376	439	410	18	21	17
Clothing industries	222	475	410	5	12	18
Furniture industry	48	40	25	2	3	1
Iron and steel workers	72	56	71	..	..	2
Leather workers	34	19	15	..	..	1
Lumber industry	44	295	74	..	4	1
Meat cutting	70	35	39	..	2	..
Metal trades	547	504	435	14	31	23
Mining	399	405	177	3	2	5
Paper manufacturing	51	36	34	2	1	..
Printing and publishing	25	40	39	4	3	4
Shipbuilding	27	101	136	..	..	2
Textile industry	258	233	202	3	5	3
Tobacco	61	44	47	2	2	2
Transportation	224	330	186	4	1	..

Exhibit 1

1917 and 1918. These fifteen groups were the center of strike troubles and suffered a greater number of strikes than any other similar group. The graph shows that there was more trouble in the metal trades during each of the three years than in any other, while the building trades ran a close second, particularly since 1917. More recent, though incomplete, figures show that during the first three months of 1919 there were 206 strikes in the building trade, as against 127 in the metal trades.

Worked out on a percentage basis, the greatest amount of trouble as regards these fifteen groups is found to have occurred in the following five industries during 1916, 1917, 1918:

	Per Cent
Metal trades	19
Building trades	15
Clothing	14
Mining	12
Transportation	9

Exhibit 2 presents in chart form the number of strikes occurring in these fifteen basic industries during 1916, 1917, and 1918.

Why Do Strikes Occur?

An illuminating analysis of the causes of recent strikes and lockouts is presented by *Exhibit* 3. This tabulation shows the percentage of strikes which were caused by the different matters in dispute. It affords a clear presentation of the importance of any one factor in causing strikes, and the comparative importance of all factors year by year. The plan is unique and brings out many interesting results not obtainable from a mere survey of the actual figures.

The most striking feature is the extreme importance which seems, relatively, to belong to the question of wages. The records for the years covered show that 35 per cent of the total number of strikes is caused by wages alone,

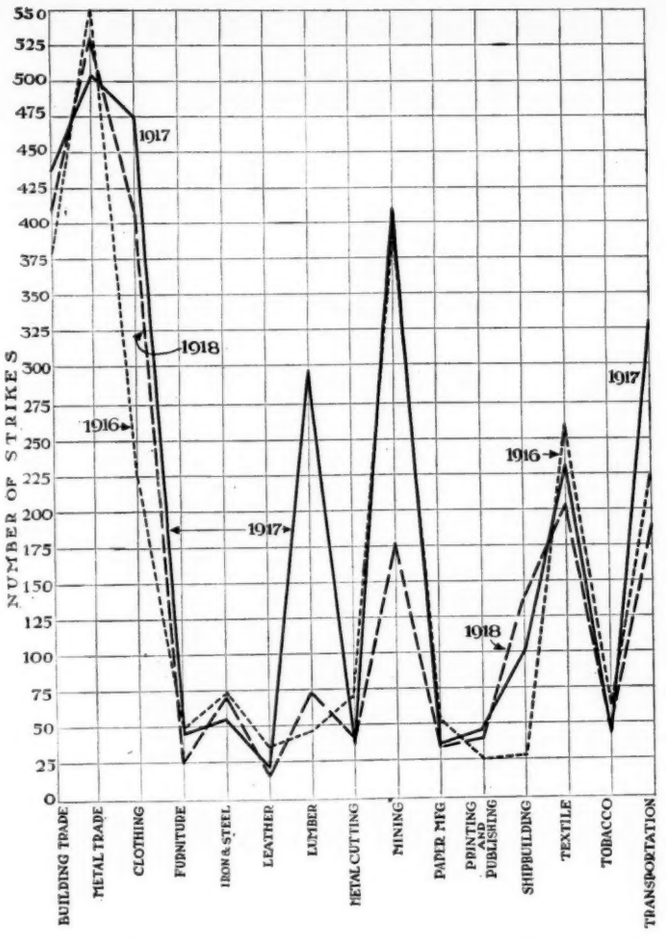

Exhibit 2—Number of strikes by industries

Principal Causes of Strikes and Lockouts 1916, 1917, 1918, 1919

(Approximate Percentages)

Matter in Dispute	Strikes				Lockouts			
	1916, per Cent	1917, per Cent	1918, per Cent	1919 (½ Yr.), per Cent	1916, per Cent	1917, per Cent	1918, per Cent	1919 (½ Yr.), per Cent
For increase of wages	35.10	35.60	42.50	26.70	10.57	13.50	13.49	7.02
Because of decrease of wages	1.00	.80	1.07	3.72	1.84	1.59	1.93	1.75
Non-payment of wages	0.35	0.40	0.98	0.58	.....	0.79	.....	.....
Because of increase of hours	0.08	0.40	0.19	0.13	2.67	.....	.....	.....
For decrease of hours	3.02	2.89	2.48	4.62	1.84	3.97	.....	3.50
For increased wages and decreased hours	13.04	8.80	7.80	12.53	1.84	3.17	1.93	10.50
Recognition of union	9.36	6.50	5.84	5.71	20.20	31.00	33.60	24.60
Recognition and wages	3.32	3.50	3.00	2.25	1.84	3.97	1.93	3.50
Recognition and hours	0.60	0.64	0.50	0.45	0.92	0.79	.....	.....
Recognition, wages and hours	1.85	1.32	2.08	2.70	4.59	.....	.....	.....
Recognition and conditions	.....	0.30	0.22	3.21	.....	.....	.....	.....
General conditions	1.58	2.25	1.70	2.44	.....	3.17	1.93	.....
Conditions and wages	1.52	1.65	1.57	0.69	1.84	0.79	1.93	.....
Conditions and hours	0.08	0.40	0.06	.....	.....	0.79	.....	.....
Conditions, wages and hours	0.68	0.61	0.25	0.26	.....	.....	.....	.....
Discharge of foreman demanded	0.46	0.88	1.67	.....	.....	0.79	.....	.....
Because of discharge of employees	3.32	4.80	4.30	5.46	4.59	2.38	.....	.....
Employment of non-union men	2.00	1.80	1.92	0.81	3.67	0.77	.....	.....
Relative to agreement	1.03	1.77	1.29	3.21	1.84	2.38	.....	.....
New agreement	1.01	0.52	0.12	1.22	2.75	1.59	.....	.....
Sympathy	0.87	1.61	1.07	2.50	0.92	0.79	0.97	1.75
Jurisdiction	0.52	0.47	0.50	0.45	....	.....	.....	.....
Miscellaneous	3.18	4.09	5.34	5.46	2.75	3.97	8.70	1.75
Not reported	16.00	18.00	13.55	14.90	30.30	23.80	33.60	45.63
TOTAL	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Exhibit 3

while practically 55 per cent involve wages in combination with some other element. Despite these figures, the importance of wages as a cause of strikes is not overwhelming. Those employers who—without being forced to it in time of industrial unrest—have whole-heartedly and in a practical manner attempted to gain the confidence of their employees are usually able to show the employee to the latter's satisfaction the injustice of an exorbitant wage demand, should such a demand be made.

Every strike, whatever may be the stated cause, has its birth in certain psychological reactions. The cause stated for the actual strike is merely a physical resting place for the results of these reactions.

Consequently these figures, which emphasize the immense importance of wages in strike troubles, are really guide posts pointing the way to the necessity for a fair-play, man-to-man spirit of co-operation between the employer and his own employees; they are, too, a challenge to find the practical way of establishing this relationship.

The Sympathetic Strike

The percentage of strikes which were sympathetic in nature is negligible, the average percentage for the three years being but a little over 1 per cent. These figures are significant in light of the widespread threats and discussion of the sympathetic strike. The small number of sympathetic strikes is indicative of the importance to be given to utterances of the prophets of the much-talked-of general strike.

The worker himself is the principal consumer, and any widespread stoppage of work tending to increase prices will ultimately injure him in the form of high prices. The actual loss in wages to the individual workman during the time of the strike is often serious, while the benefits which accrue to him are negligible. When one man stops work he finds himself without resources with which to live, as soon as he has spent his accumulated savings; if everyone stops work the individual result will be extended to everyone. High wages are merely increased production in another form and can never accrue through a stoppage in production. The general strike or even a widespread sympathetic strike would benefit chiefly the political aspirations of the strike leaders, but would work no advantage to the mass of participants. As a result most of the talk concerning such a strike comes from the leaders; thus it is only too apt to gain widespread credence.

The opinions of these leaders are widely quoted in the public press, and are apt to be taken as exactly representing the opinion of the mass of workers. This is unfortunate, since a survey of the individual opinions of the men whom these leaders represent would reveal many things not brought out by a mere perusal of the opinions of those leaders.

These statistics prove that the use in the past and the possibilities in the future of large numbers of sympathetic strikes are not nearly so large as the amount and prominence of the discussion concerning them might lead one to believe.

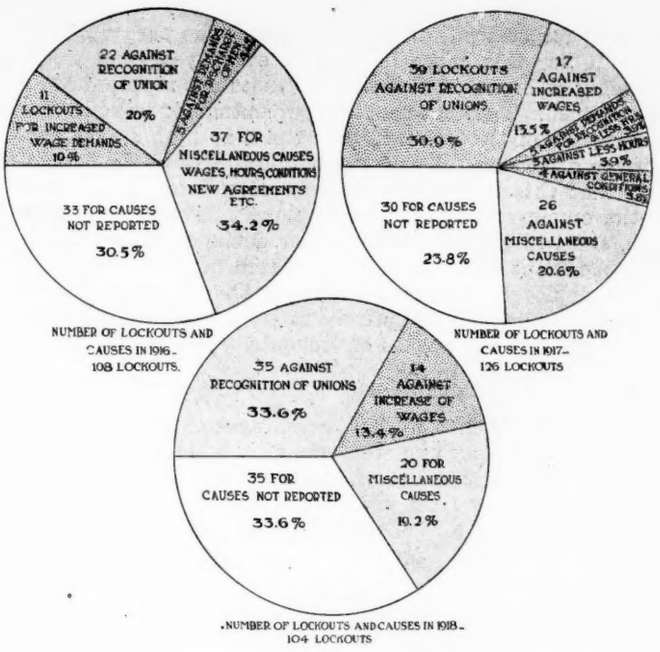
22 AGAINST RECOGNITION OF UNION 20%
11 LOCKOUTS FOR INCREASED WAGE DEMANDS 10%
37 FOR MISCELLANEOUS CAUSES WAGES, HOURS, CONDITIONS NEW AGREEMENTS ETC. 34.2%
33 FOR CAUSES NOT REPORTED 30.5%
NUMBER OF LOCKOUTS AND CAUSES IN 1916 - 108 LOCKOUTS.
39 LOCKOUTS AGAINST RECOGNITION OF UNIONS 30.9%
17 AGAINST INCREASED WAGES 13.5%
30 FOR CAUSES NOT REPORTED 23.8%
26 AGAINST MISCELLANEOUS CAUSES 20.6%
NUMBER OF LOCKOUTS AND CAUSES IN 1917 - 126 LOCKOUTS
35 AGAINST RECOGNITION OF UNIONS 33.6%
14 AGAINST INCREASE OF WAGES 13.4%
35 FOR CAUSES NOT REPORTED 33.6%
20 FOR MISCELLANEOUS CAUSES 19.2%
NUMBER OF LOCKOUTS AND CAUSES IN 1918 - 104 LOCKOUTS

Exhibit 4—Causes of lockouts

Conditions and Hours

The number of strikes caused by a desire for better conditions during the past three years is an interesting commentary upon the efforts among employers to bring working conditions up to a high standard. The percentage caused by a desire for better conditions averages a little less than 2 per cent, while the number caused by conditions and some other factor raise this average only slightly.

The question of hours, too, is found to play a small part as a primary cause of strikes. In connection with wage demands, the desire for less hours of work runs second as a cause of strikes only to the demand for more wages alone. The very high percentages caused by wages alone, however, and the very low percentage caused by hours alone warrant the conclusion that the strikes caused by a combination of these two factors are caused less by demands for shorter hours than by demands for higher wages.

So large a percentage of the causes of lockouts is listed as "Not reported" that an intelligent analysis of these figures is difficult. There is, however, the outstanding fact that the predominant cause of lockouts is a demand by

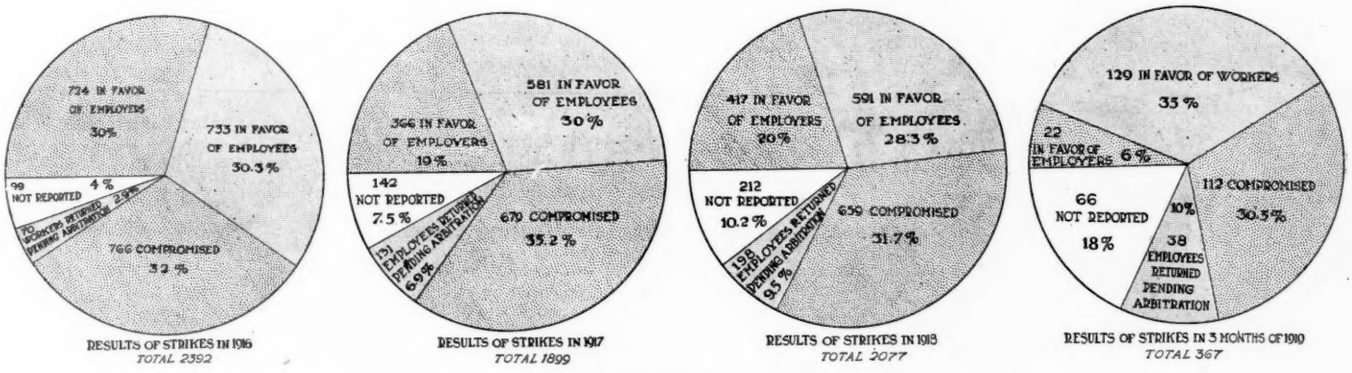
724 IN FAVOR OF EMPLOYERS 30%
733 IN FAVOR OF EMPLOYEES 30.3%
99 NOT REPORTED 4%
70 WORKERS RETURNED PENDING ARBITRATION 2.9%
766 COMPROMISED 32%
RESULTS OF STRIKES IN 1916
TOTAL 2392
366 IN FAVOR OF EMPLOYERS 19%
581 IN FAVOR OF EMPLOYEES 30%
142 NOT REPORTED 7.5%
131 EMPLOYEES RETURNED PENDING ARBITRATION 6.9%
679 COMPROMISED 35.2%
RESULTS OF STRIKES IN 1917
TOTAL 1899
417 IN FAVOR OF EMPLOYERS 20%
591 IN FAVOR OF EMPLOYEES 28.3%
212 NOT REPORTED 10.2%
198 EMPLOYEES RETURNED PENDING ARBITRATION 9.5%
659 COMPROMISED 31.7%
RESULTS OF STRIKES IN 1918
TOTAL 2077
129 IN FAVOR OF WORKERS 35%
22 IN FAVOR OF EMPLOYERS 6%
66 NOT REPORTED 18%
38 EMPLOYEES RETURNED PENDING ARBITRATION 10%
112 COMPROMISED 30.5%
RESULTS OF STRIKES IN 3 MONTHS OF 1919
TOTAL 367

Exhibit 5—Results of strikes

workers for recognition of the union. The percentage of lockouts for this cause is high in every year and would probably be higher still if all the causes not reported could be obtained. The fact that the percentage of lockouts for recognition of the union is four times as high as the percentage of strikes for that cause might lead to the conclusion that this factor is relatively of greater importance to the employer than to the employee. This is probably true, since in granting many other demands the employer may benefit possibly through increased production as well as the employee, while in recognizing the union the benefit usually accrues almost entirely to the employee. *Exhibit* 4 is a chart of the causes of lockouts.

Fundamental Strike Causes

In surveying generally the percentages of strikes caused by the various reasons listed, one fact is particularly significant. The percentage of strikes due to any one cause varies but slightly from year to year.

The conclusion may be drawn from this that the same problems are being confronted each year and that their relative importance is changing very little. Since the trouble does not lie in the rise of any new problems, the lessons of experience should serve as a decided aid in solving the difficulties of industrial relationships.

Strikes, as Mr. Tipper has frequently pointed out in his articles, find their genesis in something far deeper than the apparent or stated cause. Strikes for increased wages must in the long run be met in a broader way than that of merely increasing money payments. Almost any human being is desirous of earning more money than he now does; certainly almost any wage earner. Any wage earner is not, on the other hand, certain to be in sympathy with the political aspirations of union leaders. Recognizing these facts, union leaders have too often played upon the natural human desire for more wages in order to attain certain ulterior ends which do not appear on the surface as their final goal. This is not, of course, always the case, but it is the case often enough to warrant the statement that the abnormally high percentage of strikes caused by a desire for more wages alone can and must be reduced by the establishment of frank and confidential relations between every employer and his employees. With such a firm basis

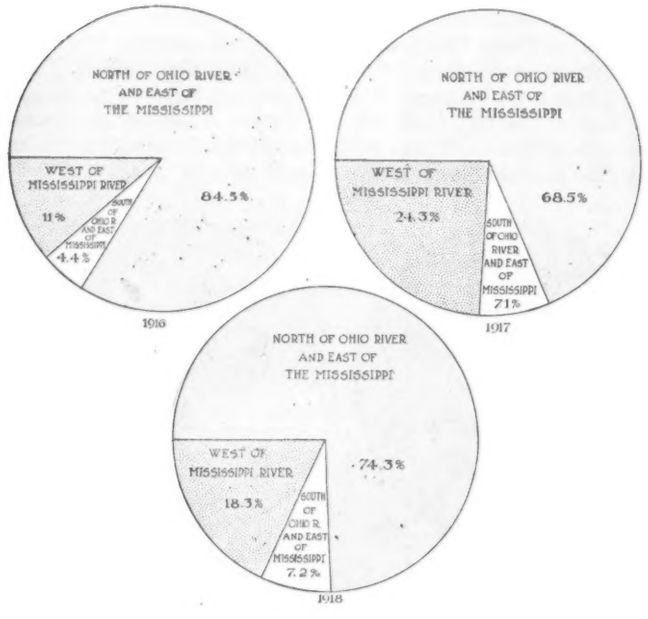

Exhibit 6—Strikes in various sections

Number of Strikes and Lockouts, by States and Sections 1916, 1917 and 1918

State or Section	Strikes			Lockouts		
	1916	1917	1918	1916	1917	1918
Alabama	14	17	13	1	3	..
Alaska	3	5	2	..	..	1
Arizona	7	20	3	..	..	1
Arkansas	20	35	10	..	..	..
California	54	105	90	1	7	2
Canal Zone	4	..	..	..	..	..
Colorado	17	46	29	..	2	3
Connecticut	325	121	70	1	..	2
Delaware	12	17	14	..	..	..
District of Columbia	7	14	13	1	..	..
Florida	9	14	18	..	2	2
Georgia	8	26	37	..	2	3
Hawaii	4	1	1	..	..	..
Idaho	5	32	10	..	..	..
Illinois	149	276	235	10	6	11
Indiana	70	65	68	5	8	8
Iowa	25	63	39	1	2	2
Kansas	12	43	32	..	2	1
Kentucky	11	37	17	2	1	2
Louisiana	7	39	16	1	..	..
Maine	30	40	36	..	..	..
Maryland	45	56	69	3	3	1
Massachusetts	374	342	336	9	11	4
Michigan	66	62	59	5	2	..
Minnesota	24	52	40	6	1	..
Mississippi	4	13	4	..	..	1
Missouri	90	117	99	7	5	5
Montana	14	66	28	1	3	1
Nebraska	21	27	11	..	1	..
Nevada	..	2	6	..	..	..
New Hampshire	20	20	17	..	..	..
New Jersey	411	219	138	6	8	..
New Mexico	..	4	2	..	..	..
New York	577	679	662	15	15	21
North Carolina	7	7	12	1	..	1
North Dakota	..	2	3	..	..	..
Ohio	276	265	188	14	14	9
Oklahoma	24	33	17	..	2	2
Oregon	22	57	18	1	1	..
Pennsylvania	566	481	303	8	13	7
Porto Rico	23	6	5	..	..	..
Rhode Island	76	103	53	1	2	..
South Carolina	5	7	3	..	..	..
South Dakota	..	2	3	..	1	..
Tennessee	24	40	22	2	2	3
Texas	28	56	37	..	..	3
Utah	3	21	12	..	..	2
Vermont	10	8	9	..	..	..
Virginia	14	34	36	2	1	1
Washington	57	290	126	1	4	2
West Virginia	39	64	49	1	..	1
Wisconsin	61	55	52	2	2	2
Wyoming	..	2	5	..	..	..
Interstate	4	25	4	..	..	..
Total	3678	4233	3181	108	126	101
North of the Ohio and east of the Mississippi	3107	2900	2366	80	85	65
South of the Ohio and east of the Mississippi	165	304	232	9	11	14
West of the Mississippi	406	1029	583	19	30	25

Exhibit 7

of mutual understanding, just demands will be met and unjust demands will die a natural death.

Is Labor Gaining Ground?

The basis of the following compilation is illustrative of the unfortunate tendency to regard employer and employee relationships in the light of a struggle between the two principals rather than a struggle of the two to attain a just solution. It is, nevertheless, important to know with what success the striking workers are meeting.

Exhibit 5 portrays the relative success of employers

and employees in the strikes of 1916, 1917 and 1918. The figures upon which these charts were based cover 2392 strikes in 1916, 1899 strikes in 1917, 2077 strikes in 1918, and 367 strikes during the first three months of 1919.

The results show that the percentage of strikes won by the workers remains about the same during each year, but that after an even break in 1916 the employers have lost ground. The loss by employers is accounted for by the increased percentages recorded under the heading "Employees returned to work pending arbitration." The percentage of strikes compromised has varied but little. Every compromised strike is, in a sense, however, a loss to the employer and a gain for the employees, since the latter have, through it, gained at least a portion of the objectives.

Where the Trouble Occurs

Exhibit 6 portrays in graphic form the percentage of strikes which occurred in the various sections of the country during 1916, 1917 and 1918. *Exhibit* 7 lists the numbers of strikes and lockouts by states, showing which states have been affected to the most marked degree.

In a very general way it may be said that the number of strikes varies directly with the population. This is natural, as the more populous states embrace all the large industrial centers, which are, of course, the places in which strikes usually occur. In the nine states having the highest number of strikes during 1916, 1917 and 1918, only two states of particular importance in the automobile trade appear. Ohio has had an average of 243 strikes per year, ranking fifth in this respect, while Illinois ranks sixth with an average of 220 per year. The three-year totals and averages for the nine states leading in number of strikes are:

State	Total Strikes	Average Per Year
New York	1,918	639
Pennsylvania	1,350	450
Massachusetts	1,052	351
New Jersey	768	256
Ohio	729	243
Illinois	660	220
Connecticut	516	172
Washington	473	158
Missouri	306	102

Michigan, the center of the automotive industry, ranks far down the list with a total of only 189 and an average of 22, less than one each month.

Miners Lead Striking Trades

Although the metal trades suffered more strikes than any other industrial employing group, the miners have struck more times within the last three years than any other workmen. *Exhibit* 8 shows the number of strikes, classified according to individual occupations, which occurred during 1916, 1917 and 1918. The miners, during this time, conducted an average of 286 strikes each year, while the machinists followed them with an average of 218. Next in order were the molders with 136 per year and the teamsters with 113 per year. The remaining groups struck fewer times than these leaders, but every trade or occupation of any importance is represented in the list.

The outstanding feature of *Exhibit* 9 is the fact that most strikes are shown to begin in the month of April.

Number of Strikes in Individual Occupations in Which the Largest Number of Strikes Occurred, 1916, 1917 and 1918

Occupation	Strikes			Lockouts		
	1916	1917	1918	1916	1917	1918
Bakers	66	92	41	15	13	4
Boiler makers	23	43	27	...	1	...
Boot and shoe workers	44	37	48	1	1	2
Brewery workers	19	22	26	2	...	...
Brickmakers	22	9	5	1	...	...
Building laborers	53	72	26	1	2	...
Carpenters	73	97	75	2	3	3
Freight handlers	41	58	24	...	...	...
Glassworkers	40	19	13	...	2	...
Hat and cap makers	22	43	34	1	3	...
Inside wiremen	32	33	44	4	2	4
Longshoremen	68	61	29	...	...	...
Machinists	255	195	203	8	13	7
Metal polishers	40	23	24	2	6	1
Miners, coal	370	339	149	3	2	5
Molders	145	155	108	3	5	6
Painters	45	41	57	...	4	1
Plumbers and steam fitters	52	53	70	1	4	3
Rubber workers	37	15	13	1	...	1
Sheet-metal workers	20	32	45	1	2	...
Street railway employees	55	111	115	3	1	...
Structural-iron workers	23	15	19	1	...	...
Tailors	32	53	48	...	1	1
Teamsters	108	163	127	6	6	2

Exhibit 8

It is at this time that the majority of agreements come to an end. The chart indicates then, that the ending of an agreement is very often the signal for increased demands on the part of workers.

Strikes Do Not Usually Last Long

That more strikes end within twenty-four hours than in any other specified period is brought out by *Exhibit* 10. When they do not terminate on the first or second day, the tendency is for strikes to run to fifteen days. There is probably more than a casual relation between the fact

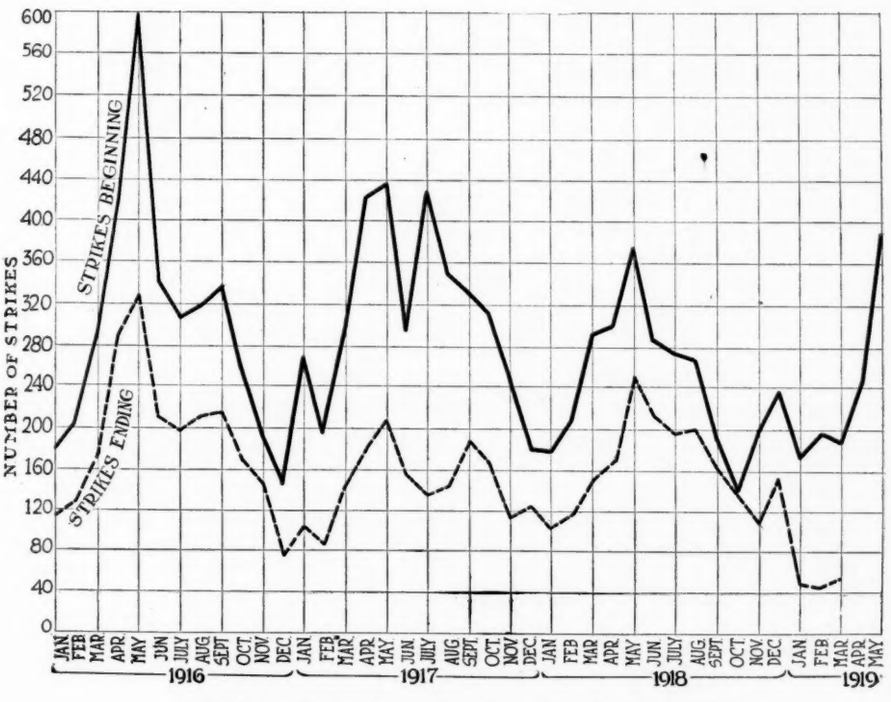

Exhibit 9—Beginning and ending of strikes by months

that many strikes end on the fifteenth day and that from the fifteenth day on the American Federation of Labor becomes responsible for strike benefits. It is significant of the staying power of some unions, however, that in every one of the years represented on the chart there have been 10 or more strikes which lasted more than 200 days.

The A. F. of L. Grows Rapidly

Any analysis of the labor situation in the United States to-day must include careful consideration of the American Federation of Labor. This powerful labor organization has grown from a membership of 264,825 in 1897 to over four million in 1920. Over a million of this gain in membership has been made within the last two years, 826,449 having been gained in 1919 alone.

Exhibit 11 shows in graphic form the rise in membership, and illustrates clearly the extremely rapid rise during 1916, 1917 and 1918. *Exhibit* 12 is a tabulation of statistics concerning the A. F. of L.

The number of local unions affiliated with the A. F. of L. has now grown to 33,852, more than six thousand charters having been issued during 1919. While these 6743 were being issued last year, however, 1719 were being withdrawn.

If the power of the American Federation of Labor be gauged by the size of its membership, the organization is nearly three times as powerful at present as it was in 1909. It is doubtful if this is the case. Numerous facts tend to show that the apparent power of this big American labor unit is much greater than its real power, whether that power be exercised for good or ill.

One of the chief effects of the rapid growth of the American Federation of Labor is the inevitable growth of class consciousness that has accompanied it. America is beginning to hear for the first time of the middle class, and the line of conflict between capital and labor is becoming more clearly defined. This tendency is a direct corollary to the growth of the A. F. of L. and cannot be counted a desirable factor in bringing about that co-operation between employer and employee which must be the ultimate solution to the industrial problem.

Analyzing Real Power of A. F. of L.

Exhibit 13 is a graph which shows the number of strikes recorded by the Department of Labor and the number recorded by the American Federation of Labor. Charted in this way, these figures bring to light a striking condition. About 900 strikes are seen to have occurred in 1918 without the authorization of the American Federation of Labor, presumably participated in only by men not members of the A. F. of L., since the strikes are not recorded by that organization. This would bring the conclusion that even though employers were in every case willing to work under agreements with the A. F. of L. a large number of strikes would still occur; that they would occur even though the A. F. of L. held perfect control of all the members of its organization.

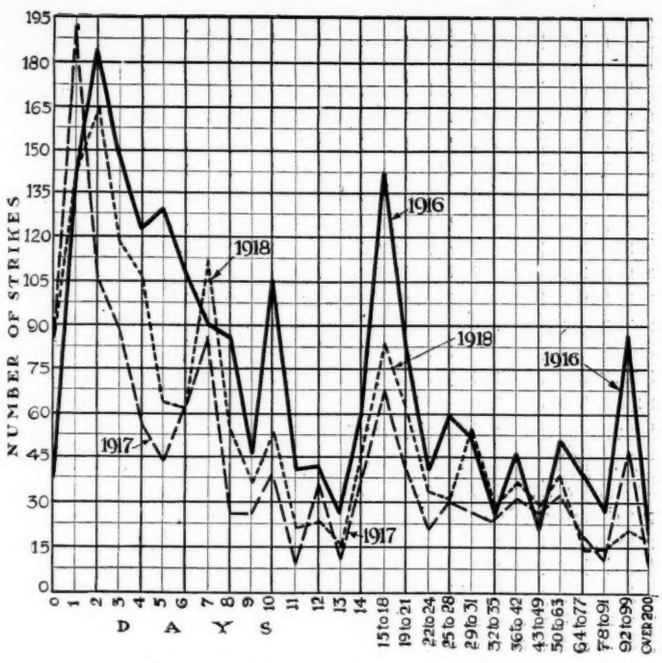

Exhibit 10—*Duration of strikes*

That unauthorized strikes are occurring in ever-increasing numbers, however, within the ranks of the Federation is apparent to every student of labor affairs.

The printers' strike and the 'longshoremen's which recently occurred in New York City are two glaring examples of this vital deficiency in the Federation power.

The talk of "boring-in" of radicals in the Federation bears all the signs of having a foundation of truth, and constitutes another reason for not gauging the power of the Federation merely by the number of its members. How successful this "boring-in" has been cannot easily be calculated; in fact, it is not known even by the officials of the Federation. In proportion as it has been successful, however, the power of the Federation has undoubtedly been weakened, since the aims of the radicals are not those of the conservative leaders of the Federation.

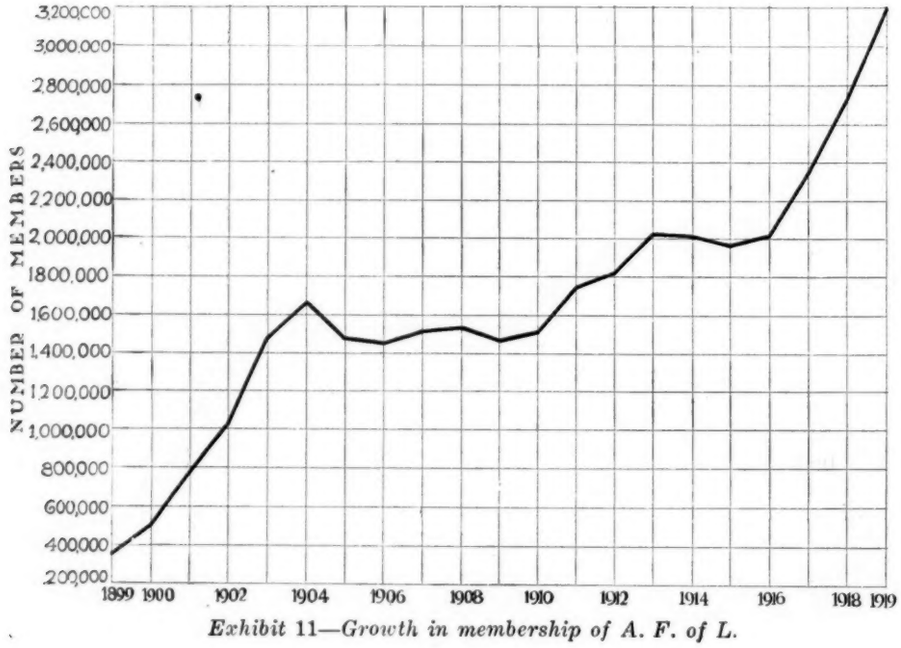

Exhibit 11—*Growth in membership of A. F. of L.*

In Unity There Is Strength

But all these are surface causes; the fundamental reason for the unsettled status of the real power of the Federation lies below the surface.

Labor unionism grew up because all labor was weak; because workmen had to band together that a group of them might be economically equal to

one of the employer group. The primary purpose of the union was to give the workman strength enough to force from the employer better conditions, reasonable working hours and higher wages. The unity of the union lay and still lies in the opposition of all its members to the same thing; it is essentially a unity of fighting the same object.

Gradually, however, the power of labor has grown, until suddenly it finds itself at least on a level with its opponent. But with this power has come also the burden of public responsibility. This responsibility formerly rested entirely upon the employer; now it is being shifted, partially at least, to the shoulders of labor. The inevitable result is a lack of unity in the aims and desires of the unionists. In opposing the same thing they were unified, but in building, in meeting constructive responsibility, there arise as many different aims and purposes as there are union leaders. Constructive building is now necessary; unionists must, by reason of their new power, share in the public responsibility, but thus far they have been unable to meet the demands. Through years of opposing the same object they have been in complete unity, but when suddenly the responsibility for constructive work has arisen, the scenes which occurred at the erection of the Tower of Babel are being only too accurately re-enacted.

The conservative leaders, realizing and taking upon themselves this new responsibility, find it necessary to say "No" to many who are trying to go forward into a constructive era with the same irresponsibility as through the many years of mere opposition. The task of these leaders is a large one; they may solve it successfully, but until they do, the power of their organization cannot be justly judged by the number of its members.

A. F. of L. Statistics Concerning Strikes

Statistics relative to strikes, issued by the American Federation of Labor, are presented in *Exhibit* 14. The heading "Cost of Strikes" refers to the cost of the strike to the American Federation of Labor. The other costs of strikes will never be accurately estimated.

There is no apparent connection between the number of strikes won and the growth of the organization, nor in the number involved in the strikes each year.

The point of particular interest in this set of figures is the material concerning the number involved in the various strikes and the number benefited. In only one case during the nine years listed has the number benefited by the strike exceeded the number engaged in it. In every other case it would seem that many men went out on strike without receiving any personal benefit whatever. In 1912, for instance, eighteen times as many men went on strike as were benefited.

Have Wages Kept Pace With Prices?

A careful investigation of the figures concerning the cost of living and the rise in wages fails to reveal any satisfactory basis for comparison. Probably the best statistics extending over a period of years are Bradstreet's index figures, which show a rise in the cost of living of 105 per cent since 1914. These figures, however, are based upon a number of groups which comprise wholesale prices.

The workman, in making his purchases, must pay, of course, the retail price, which corresponds only in a very general way to the wholesale price. For instance, if the price of live stock rises 10 per cent it is no sign that retail prices will not rise 15 per cent, while it is obvious that the rise in rents cannot be judged by the rise in building materials.

The profiteer hunt conducted by Attorney-General A. Mitchell Palmer has disclosed the fact that retail prices are the result of many factors other than the rise and fall in wholesale price. It will be noticed that those commodities which were regulated by the War Industries Board suffered sharp declines in July, 1917, when the Board took control. Although these commodities have not experienced the remarkable increase in cost displayed prior to July, 1917, they have nevertheless reached levels considerably above those of 1913, 1914 and 1915. Those commodities which were not controlled by the War Industries Board have all increased in price from 50 per cent to 500 per cent.

The wage figures compiled after a comprehensive survey by the Bureau of Labor Statistics are the best obtainable for that field, but do not offer a good basis for comparison with cost of living figures. In the iron and steel industry, for instance, the relative hourly earnings of the rollers in plate mills has decreased 5 per cent since 1914, while the average increase in wages of the industry as a whole has been 126.5 per cent.

The coal mining industry furnishes another example. The wages of bituminous miners in general has increased 38 per cent since 1914, but the wages of greasers and couplers, specific workers in this industry, have increased 133 per cent.

Moreover, when the difference in individual necessities

Statistics Concerning American Federation of Labor

	National and International Unions	Local Unions	Charters Issued	Charters Surrendered	Gain in Membership
1911	.....	.....	2,345	1,358	117,596
1912	112	20,964	2,388	1,422	216,012
1913	111	20,046	2,682	1,348	295,695
1914	110	21,460	2,578	1,351	62,822
1915	110	21,887	1,791	1,421	38,509
1916	111	21,711	2,699	4,403	267,152
1917	111	26,761	3,793	1,557	319,671
1918	111	27,755	2,977	1,052	591,498
1919	111	33,852	6,743	1,719	825,449

Exhibit 12

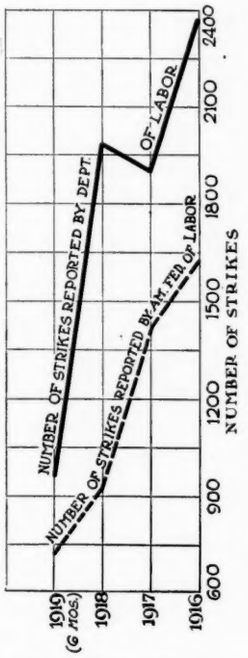

Exhibit 13—*Number of strikes reported by the Department of Labor and American Federation of Labor during* 1916-1919

American Federation of Labor Strike Statistics

	Number of Strikes	Strikes Won	Strikes Lost	Strikes Compromised	Strikes Pending	Number Involved	Number Benefited	Cost of Strikes
1911	1,086	642	93	90	261	170,526	104,655	$4,709,550.69
1912	772	378	61	58	275	73,069	6,177	1,928,380.50
1913	969	554	65	89	261	294,236	186,644	3,345,721.43
1914	957	543	60	118	236	131,324	74,350	4,280,306.68
1915	1,004	552	119	115	218	144,932	99,543	3,418,831.72
1916	1,622	1135	49	133	305	260,015	126,181	2,708,789.33
1917	1,417	897	86	120	314	194,802	215,019	2,291,086.85
1918	922	570	43	108	201	140,042	134,033	1,295,031.07
1919	1,515	1030	52	170	263	234,466	203,876	1,391,833.30
	10,264	6301	628	1001	2334	1,643,412	1,151,478	$25,169,550.60

Exhibit 14

and tastes is considered, the impossibility of determining the "cost of living" in anything but a very general way is obvious. Writing in the *Monthly Labor Review* of July, 1919, Royal Meeker, United States Commissioner of Labor Statistics, says: "There is no such thing as the American standard of living in the sense of a very superior standard giving all the necessities, many of the comforts, and a goodly supply of the luxuries of life. On the contrary, we find that there are as many different standards as there are different incomes and families of different sizes."

Consequently, it is wise to take with many grains of salt all the material being currently published in the press concerning this important subject.

Exhibit 15 shows the numbers employed in the leading industries during the past few years.

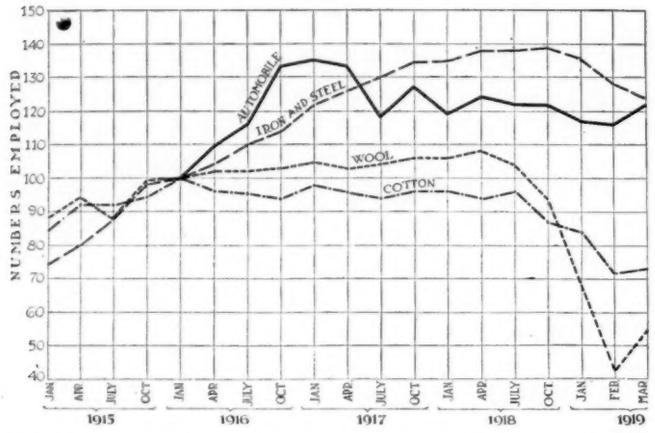

Exhibit 15—*Trend of the numbers employed, showing that the demand for workers reached its highest level just prior to October,* 1918. *The wool trade is seen to have dropped steadily and rapidly since the signing of the armistice*

Number of Establishments Reported as Adopting the 8-Hour Day in 1915, 1916, 1917, 1918, and the First Six Months of 1919, by Industries

(Based on 672 reports showing number of establishments involved)

Industry	48-Hour Week					44-Hour Week		
	1915	1916	1917	1918	1919, Jan. to June	1915–1917	1918	1919, Jan. to June
Aluminum manufacturing	...	1	...	2	....	...	...	....
Bakeries	...	3	5	1	219	...	...	....
Boots and shoes	...	2	...	1	91	...	...	93
Bottlers and brewers	7	2	3	2	....	...	...	....
Brass workers	1	2	1	...	1	...	...	....
Broom manufacturers	...	31	...	1	....	...	...	....
Building trades	1	60	16	24	3	23	76	28
Carriages and automobiles	...	13	3	1	1	...	...	....
Chemicals	4	2	...	...	1	...	...	....
Clerks, store	...	...	4	...	1	...	...	....
Cooperage	...	3	...	...	....	...	...	....
Electrical supplies	8	4	2	5	2	...	...	....
Electric and gas lighting	...	2	1	7	7	...	1	....
Food and tobacco	4	2	1	3	1	...	...	....
Foundry and machine shops	154	256	127	66	76	2	18	19
Furniture	...	5	8	1	50	...	1	....
Garment workers	5	1971	140	90	1	...	4	48
Glass manufacturing	...	1	2	1	16	1	...	....
Hardware and stove manufacturing	1	2	1	6	....	...	...	....
Hotel and restaurant workers	...	20	3	1	....	...	...	....
Iron and steel	...	1	1	8	13	...	...	....
Jewelry	...	200	....	....	1	...	1	....
Laundry	1	1	....	....	....	...	...	2
Leather workers	...	...	3	2	....	...	...	....
Longshoremen	...	...	....	....	....	...	...	2
Lumber	...	5	159	201	....	...	...	....
Metal polishers	...	39	6	7	78	...	3	69
Mining	...	38	18	62	1	...	...	....
Municipal and state employees	2	4	3	1	3	...	1	....
Munitions	6	8	2	78	....	...	...	....
Musical instruments	1	2	1	1	....	...	...	....
Oil workers	4	4	3	1	....	...	...	....
Packers	...	...	...	25	2	...	...	....
Paint manufacturing	...	...	...	2	1	...	...	....
Paper manufacturing	...	28	22	19	....	...	...	....
Pattern makers	...	...	19	14	....	...	8	....
Plated ware	2	1	2	...	....	...	...	....
Policemen and firemen	1	1	4	3	....	...	...	....
Printing and publishing	3	1	1	2	6	...	1	2
Railroads and steamships	...	3	45	21	10	...	3	2
Rubber goods	1	11	2	...	2	...	...	....
Ship and boat building	2	4	5	13	....	...	5	1
Street railways	...	...	2	3	....	...	...	....
Teaming	...	...	...	4	....	...	1	....
Telephone and telegraph	1	1	7	1	1	...	...	....
Textile workers	1	1	2	100	599	...	...	44
Theatrical employees	...	1	...	2	....	...	...	....
Miscellaneous	1	1	7	5	....	2	7	2
Total	211	2737	631	706	1187	28	130	312

Exhibit 16

Eight-Hour Day Widely Adopted

During the first half of 1919 there were a large number of firms which adopted the eight-hour day. If the last half year recorded a similar tendency the record for the year would bid fair to equal that of 1916, which thus far, with its 2737 adoptions, is a banner year.

The number of establishments reported as adopting the eight-hour day in 1915, 1916, 1917, 1918 and the first half of 1919 is shown by industries in *Exhibit* 16. *Exhibit* 17 shows in graphic form the total number of adoptions.

The large number of adoptions of either the 48 or 44-hour week indicate a tendency on the part of employers and employees to decide upon working hours to their mutual satisfaction. The adoption of the eight-hour day must, of course, depend upon the peculiar circumstances of the particular plant, but the fact that the worker must have time to do more than merely work, eat and sleep is now generally recognized. The employees of the Clark Equipment Company, a foundry distinctive for its beautiful surroundings, find ten hours a day compatible with the living of a full and enjoyable life. There are probably other cases of a like nature, while in some instances even Lord Leverhulme's six-hour day may be found to be the most practicable; the decision should rest with the individuals concerned.

There has been within the last three years a remarkable increase in the number of works councils and employee-representation plans installed in American plants. *Exhibit* 18 is a graph which shows this tendency clearly. After going along for a number of years as an experiment in a few scattered plants, the movement for some form of employee representation suddenly took wings in 1917, largely through the advocacy and application of the plan by the War Industries Board, and since then the number of installations has rapidly increased. The plan is now in operation in 250 plants throughout the country and has met with varying success.

The Way to Industrial Peace

Undoubtedly the road to permanent industrial peace lies through a mutually satisfactory plan for the permanent co-operation of the employees in any plant with the management. The works council, the shop committee, the many types of "industrial democracy" plans, profit-sharing, bonus systems, service departments—all these are steps toward such a mutual understanding. Consequently the rapid rise in the number of works councils is a distinctly favorable sign.

It is possible, however, that the installation of these plans may go on too rapidly. The spirit behind the inception of such a plan has far more to do with its ultimate success than does any mechanical phase of the plan itself. The employer who establishes a plan of employee representation with the idea that the workman's representatives shall be merely mechanical puppets, and that the plan shall in any way act as a shield for unjust practices, is not solving his problem; he is sowing the seed of more serious future discontent. He is sowing this seed, not only for himself, but for other employers who may wish, with a true spirit of honesty and justice, to install a similar plan, for as a representative of the employing class he is giving

labor cause to suspect the honesty of that class. Such an employer is a menace to industrial society.

On the other hand, almost any form of "industrial democracy" will succeed if established and conducted on the basis of a square deal. *The plan installed is merely the means by which the "square-deal" idea is enabled to function.*

Some plants, such as the Endicott-Johnson shoe factory, have been able to make the "square-deal" function in a practical manner without any form of employee representation. This plant, commended by union leaders and socialists, as well as by employers and capitalists, is an excellent example of the fact that the spirit and not the plan is the essential factor.

In most plants some form of vehicle will, however, probably be necessary to keep the ideal of fair-play working in a satisfactory manner. Whatever the form may be, it will attain its end of furnishing justice to both parties when established and operated in a spirit of frankness.

Strikes Hinder British Production

DURING the four years of war, 18,028,000 working days were lost because of strikes. The lost days represent 13 weeks of idleness for 250,000 men, according to a report presented to the British Engineers Association, by D. A. Bremmer. The vast scope of this stoppage in work is illustrated by the fact that it means the same loss as if every wage-earner in Detroit stopped work for about six months—assuming that one out of every four persons is a wage-earner.

England suffered 1252 trade disputes during 1918, while about 1500 occurred during 1919. United States has had almost three times this number of industrial disputes, including strikes and lockouts, during the past two years.

Though the working days lost during the war in England seem to be very great in number, the 1919 statistics show a tremendous increase in time lost on account of strikes. From January to October, 1919, 30,957,000 working days were lost. This is practically analogous to every wage-earner in New York City stopping work for nearly a month.

Since the beginning of 1918 a net increase of about $29,000,000 in weekly wages has been paid in England, while during the period of January to October, 1919, 5,356,000 working people have had their hours of labor decreased.

The figures indicate that England has had her share of labor unrest. In an attempt to solve the problem constructively there have been organized 5427 separate bodies to deal with the constant disputes which are arising.

The figures are made even more impressive by the fact that they do not include railway servants, agricultural laborers, police, government employees, domestic servants, shop assistants and clerks.

British War Production of Combustion Engines

THE new president of the Institute of Engineers and Shipbuilders in Scotland is Dr. T. Blackwood Murray, D.Sc., a leader and pioneer of the British motor truck trade, joint founder of the Albion Motor Car Co. of Glasgow, inventor of probably the first polar-induction magneto. In his presidential address he was able to give some remarkable figures of output of combustion engines in the war period, much of these statistics being revealed for the first time.

The total horsepower of engines manufactured between August, 1914, and the end of 1918 amounted to no less

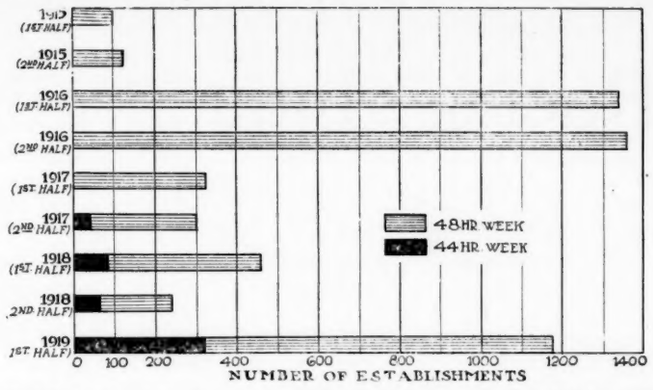

Exhibit 17—*Adoption of* 8-*hr. day Number of establishments in United States adopting* 48 *and* 44-*hour week*

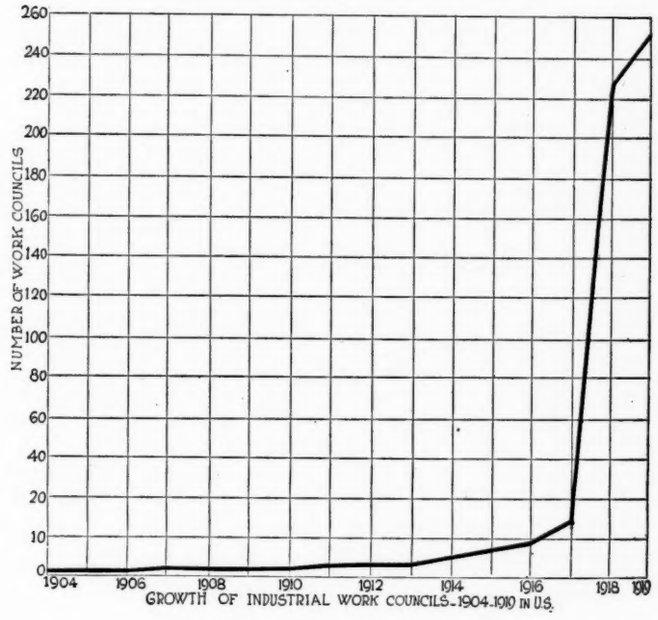

Exhibit 18—*Rise of works councils*

than 7,094,000, and more than half of the total, viz., 4,143,000 hp., was turned out in the last year of the war. Between August, 1914, and December of that year the output was only 12,000 hp., and for 1915, 1916 and 1917 the outputs were 195,000 hp., 771,000 hp. and 1,973,000 hp. respectively. The data relating to engines for mechanical transport purposes are not so complete, as they are only given from September, 1916. For the four months of that year the output amounted to 137,000 hp. and the figures for 1917 and 1918 are respectively 683,000 hp. and 662,000 hp. The production of these engines for the war period prior to September, 1916, probably amounted to about 750,000 hp., so that the aggregate production for the whole war would be 2,232,000 hp.

The manufacture of "tank" engines was commenced in 1916, in which year the production totaled 16,000 hp., while in the two following years the production was 133,000 hp. and 191,000 hp. respectively. The total production of tank engines thus amounts to 340,000 hp. From these figures it appears that what may be called small internal-combustion engines aggregating nearly 10,000,000 hp. were made during the war for the three uses mentioned above, and, as many more must have been employed for lighting and pumping sets and other work, the complete total was considerably greater. It may be interesting to add that at the conclusion of hostilities 62,000 motor lorries, 28,000 motor cars and 33,000 motorcycles were in the possession of the British War Department.

Racing's Influence on Automotive Design

Automobile racing started as a gamble—often a car would actually start; usually it failed to finish. In its intermediate days, racing was considered primarily a sport. Afterward it developed into a real school of design which pointed unfailingly to weaknesses and emphasized strength. The lessons taught have been invaluable in building up the third largest industry in the United States

ALTHOUGH twenty-five years have passed since the advent of the gasoline-propelled road vehicle, it is only comparatively recently that the automotive engineer has visualized fully the great part that racing has played throughout and has realized the extent of his indebtedness to the pioneers of speed on the road and track.

Automobile racing has also exercised an influence on the public mind, and has been the means of making motorists of many who otherwise might have not been sufficiently interested to adopt the, then, new method of road transportation. Indirectly this exciting of the potential motorist's interest has also had its effect in stimulating the improvement of design and the development of those minor details which to-day combine to insure the comfort of driver and passengers.

France was first in the racing game, and we are to-day reaping the rewards of early racing on the French roads. England came next as an exponent of the racing game—it was still a "game" in the minds of the majority—and the various manufacturing countries of Europe contributed their quotas. The United States was not idle meanwhile, and during the past five years we have had all the world's racing to ourselves.

France—the Pioneer

France has no speedways, but French car builders were enthusiastic supporters of road racing as far back as 1895, the year in which Elwood Haynes, on his first car, was held up and charged with speeding by a Chicago traffic cop. A year before there was an unofficial contest in which a Panhard and a Peugeot covered the road from Paris to Rouen at the rate of approximately 12 m.p.h., honors being divided. A brief record of earlier efforts in France follows:

Year	Course	Distance (miles)	Won by	Av. speed (m.p.h.)
1895	Paris-Bordeaux..	740.2	3½-hp. Panhard	14.9
1899	Tour de France..	1,440	16-hp. Panhard	31.9
1900	Paris-Bordeaux..	740.2	60-hp. Mors	53
1902	Dourdan.....	1	Mors (flying start)...	78.21

In these seven years French racing passed from the experimental stage to one in which real speed was attained. Car makers had learned that a combination of minimum horsepower and maximum vehicle weight had its limitations and were profiting by the lesson. Observe the different results of the two Paris-Bordeaux races and the increased horsepower of the winner of the 1900 event.

International Competition

Racing in France continued steadily year by year, teaching its lessons to designers and exciting public interest, which came almost to a culminating point in the series of Gordon-Bennett races, which were held from 1900 to 1905 inclusive. These were international competitions, run each year in the country producing the winning car. Stricter rules were now enforced, insuring a measure of equality in specifications which tended to give a better relative indication of merit and the reverse. Details of Gordon-Bennett rates follow:

Year	Winning Car and Country	Distance (miles)	Av. Speed (m.p.h.)
1900	Panhard, France.....	352	38.6
1901	Panhard, France	351	37.0
1902	Napier, England	367	31.8
1903	Mercedes, Germany	368	49.2
1904	Brasier, France	351	54.5
*1905	Brasier, France	341.5	48.5

The variations in speed are not necessarily a criterion of merit of performance, as the courses varied considerably, and the speed was affected adversely or otherwise. Normally the 1903 race should have been held in England, but as road racing was not permitted by the authorities the venue had to be changed to Ireland. This series was not essentially French (the trophy was given by James Gordon Bennett of the New York *Herald*), but as France furnished most of the winners, it is included under this head.

One of the lessons brought home to the industry in this series of races was the fact that the development in pneumatic tires had not kept pace with the improvements of a mechanical nature.

Weaknesses Found

Other weaknesses which had caused trouble in the past were being eliminated one by one. More attention was given to transmission design, frames were strengthened to withstand the stresses imposed by fast work on rough roads and troubles with steering gears and front axles were gradually overcome. In the Gordon-Bennett race of 1903 the winning Mercedes was free from mechanical trouble, but crossed the line with its front axle almost parted from the springs owing to the shearing of the bolts. It is significant that Mercedes cars did not again suffer in a similar way. In the same year the Napier shed tire after tire, owing to some mysterious defect in the clincher beads. The trouble was remedied almost right away. Racing had again proved its worth to a manufacturer who was willing to learn.

Engine Size Limited

Skipping a few years, with their increasingly interesting racing records, brings the history of French racing to the Grand Prix series. The following data are available as illustrating the advance made.

Year	Course	Distance (miles)	Won by	Av. Speed (m.p.h.)
1912	Dieppe Circuit.....	956	Peugeot	68.45
1913	Amiens Circuit	570	Peugeot	72.20
1914	†Lyons Circuit	466.6	Mercedes	65.35

*Demountable rims were first used in this race.
†A hilly course.

In 1912 a restricted race, called the Coupe de l'Auto, was run off simultaneously with the Grand Prix. In this the maximum engine capacity allowed was 3 liters, or 183 cu. in. As the races were run over the same course and at the same time the cars in the restricted class came automatically into unofficial competition with those of the unrestricted section, thus affording an opportunity of actual comparison in point of speed. To the general surprise, there was but little difference, the winning 3-liter, a Sunbeam of 2990 c.c. capacity, averaging 65.29 m.p.h. as against the unrestricted winning Peugeot's 68.45 m.p.h. The latter car had a capacity of 7600 c.c.

In the restricted class the second and third cars were also Sunbeams, an early instance of successful teamwork and evidence of real improvement in reliability.

Another race for 3-liter capacity engines was held in 1913. This was won by a Peugeot over the Boulogne course of 388 miles at an average of 63.2 m.p.h.

Further Engine Size Reduction

After this race the French manufacturers were strongly inclined to the conclusion that the future of racing lay with the small car and seriously discussed a reduction to 152 cu. in. in capacity and in weight from 1980 lb. to 1873 lb.

With this group comes the end of France's ante-war racing.

The tendency to reduce engine capacity as power developed has been continued, and it is expected that the next Grand Prix, which will be probably held in 1920, will be restricted to engines coming within the three-liter class.

The Grand Prix of 1913 was won by a car having an engine capacity of 5654 c.c. and that of 1914 by one with a capacity of 4456 c.c., further evidence of the trend in cylinder bore and stroke.

By this time wire wheels had displaced wood for racing and streamline bodies of extreme type were used universally. A better understanding of the relation of unsprung weight to the car as a unit had been arrived at, and the racing machine had assumed the general appearance it still possesses to-day.

France will resume racing just as soon as internal economic conditions render the resumption possible, not because the public are interested but for the reason that the car builder of France knows he still has something to gain from the lessons taught by racing.

British Racing.

Unlike France, the United Kingdom has never held a road race with the solitary exceptions of the Gordon-Bennett contest held, under special dispensation, in Ireland in 1903, and the Tourist Trophy races in the Isle of Man.

Nevertheless, a large number of reliability and endurance trials have been conducted from time to time.

These have served as object lessons from points of view entirely distinct from that afforded by mere speed performances, as the competing cars were, as a general rule, standard touring models.

These cars embodied such lessons as had been learned from the racing game, modified to suit individual limitations and to meet the views of the designing engineer. Sometimes mistakes were made, but on the whole the incorporated mechanical improvements again proved the value of racing. In these tests emphasis was placed on reliability, economy of operation, consistent performance within predetermined speed limits, etc. The road trials of 1900 extended over 1000 miles of roads of all types and many severe grades were purposely included in order that hill-climbing capacity should be fully and independently tested.

Economy Runs

Other individual tests were made in which marks were given for tire performance, low gasoline consumption, brake capacity and ability to make long non-stop runs. In 1904 the first side-slip trials took place on a grease-covered surface. These were designed to try out various makes of non-skids, both tires and attachments. In 1907 "dust trials" were held, which will be referred to later on.

In 1905 came the first Tourist Trophy race over a mountainous course on the roads of the Isle of Man. The total distance was 208.5 miles.

This race marked another refinement in restrictions. Speed was the primary requisite, but all the competing cars were required to have full touring equipment, and were limited to an allowance of one gallon of gasoline to each 22½ miles. In this connection it should be remembered that the British gallon contains 277.27 cu. in. as against the 231 cu. in. of the American.

This was a test of carbureter efficiency as well as of careful driving. The winning car traveled the course in 6 h., 9 min., 14.6 sec., and averaged 25.4 miles to the gallon of gasoline. The winner had 8.3 pints (British) of gasoline remaining when the race was finished.

The following year a somewhat similar race was held, the gasoline allowance being decreased to one gallon for every 25 miles. In 1907 the race was divided into light and heavy classes, and in 1908 another contest was held under changed conditions. This year the fuel restriction was eliminated and in its place came the restrictions that the engine bore was not to exceed 4 in. for a four-cylinder engine, and that the weight of the chassis should not exceed 1800 lb. This weight had to include the driver, the mechanic, spares and tools.

Here, again, is another angle on the evolution of racing. Whereas the preceding races in this group had stipulated that four-passenger touring bodies should be fitted, this race of 1908 was emphatically a chassis race. With no limit on the piston stroke, some interesting developments took place, the engine of the winning car having a stroke of 7 in.

Brooklands Track

This long-stroke development caused a lot of consideration of its possibilities, which were further discussed when the British taxation system of 1910 ignored stroke and taxed on a basis of bore.

What Racing Has Taught Us

The advantages of the streamline body.
How to make reliable pneumatic tires.
To develop demountable rims and detachable wheels.
More about wire wheels.
How to make economical carbureters.
The importance of correct distribution of weight.
How to build reliable steering mechanism.
That efficient cooling and lubrication are essential.
That transmissions and brakes must be efficient.
The value of alloy steels.
The possibilities of aluminum and its alloys.
The value of good roads.

This was the first big race won by a car having an engine with high stroke-bore ratio. Following are brief specifications and performances of winners:

Year	Car	No. of Cyls.	Bore and Stroke (m.m.)	No. of Speeds	Average Speed (m.p.h.)
1905	Arrol-Johnston	2	120x165	4	33.9
1906	Rolls-Royce	4	101x127	4	39.3
1907	Rover (light)	4	97x110	4	28.8
	Humber (heavy) ...	4	120x160	4	28.7
1908	Hutton (Napier built)	4	102x177.8	4	50.2

In 1907 the small cars covered 241.6 miles and the large 281.8 miles. In 1908 the distance was 337½ miles.

In 1907 England for the first time became possessed of a speedway, the only one in the world at the time. Brooklands track, afterward to play its part in the development of the modern passenger car, was completed. It is (or was, as it has been partially destroyed during the war) a cement track, having a circuit of 2.68 miles around its inner edge and a straight finishing track 0.625 mile long. Its maximum width is 100 ft. and at the curves the banking is 28.66 ft. high.

Brooklands track was designed primarily for racing, but it was also intended to provide testing facilities for automobile builders. A number of individual garages were erected to accommodate manufacturers' cars so that they would be available at any time for tests or demonstrations, a nominal fee being charged for the use of the track.

Remarkable 24-Hr. Performance

A few weeks after the completion of this track a six-cylinder Napier put up a remarkable 24-hour performance, the first on record. This was the more remarkable for the reason that a single driver, S. F. Edge, held the wheel throughout. The figures follow:

Distance traveled in 24th hour	Total distance in 24 hours	Average m.p.h. for entire distance
62 miles 950 yards	1,581 miles 1,310 yards	62.125

On this test the car was accompanied by two others of similar make, on which the drivers were changed every three hours, but even with this advantage they had to take second and third places to the lone driver. This was essentially a test of an individual touring car, and it marked the first occasion on which wheels were changed without the use of lifting jacks. When a tire exhibited signs of failure the car slowed down to a speed at which it cou'd be run up on an arrangement of skids which raised all four wheels from the track. By this means the work of replacing wheels was greatly expedited.

During the summer of 1907 a portion of the track was covered with a half-inch layer of fine limestone powder and a number of cars were run over this prepared surface to judge the relative amount of dust raised by different body designs. It is significant that both the manufacturers' and the private owners' classes into which the contest was divided were won by cars of standard American design; both were steamers, a White and a Stanley. Over 150 photographs were taken to determine the winner, obviously the car which raised the smallest dust cloud at a predetermined speed.

In December, 1907, Brooklands track was equipped with the first electrical timing equipment. This was entirely automatic in operation, the passage of a car over the finishing wire being registered by an electro-magnetic device and the elapsed time being recorded on a moving paper strip by three electrically actuated pens. Results were given in minutes, seconds and fractions of a second.

Edge, the leading British driver, was again in the limelight in 1908 in consequence of his refusal to start in the French Grand Prix unless he were permitted to use detachable wire wheels—a striking comment on conditions of the period.

Arising out of this came a challenge from Napier to match his six-cylinder car against any other car built for the big French race, the contest to be at Brooklands. This brought a prompt response from Fiat of Italy, and the race was duly run off. The Napier was lapped by the Fiat early in the race and soon afterward broke down. Fiat went on, and at one period of the 27.5-mile race traveled at the rate of 120 m.p.h., as attested by track officials.

In 1909 a test hill was added to the testing facilities at Brooklands. This was 343 ft. long with an average gradient of 20 per cent. The gradient increased toward the top of the hill, where it was 25 per cent. The surface was of 6-in. concrete and its width 12 ft. Electrical timing controlled the hill in sections, so that segregated timing on the various grades could be recorded. Valuable data, not only as regards hill-climbing capacity, but covering brake efficiency, wear on tires, spring stresses, etc., were also collected, and much was learned by makers from lessons taught by Brooklands hill.

Shortly before the date set for the Olympia show in 1909, Hemery, driving an 85-hp. Benz, beat the flying kilometer world's record which had stood to the credit of Marriott at Daytona since 1906.

Hemery's official times for his afternoon's work, all of them records, were:

Distance	Elapsed Time	M.P.H.
½-mile, flying start.....	14.08 sec.	127.84
Kilometer, flying start.....	17.76 sec.	125.94
½-mile, standing start.....	25.57 sec.	70.41
Kilometer, standing start..	31.32 sec.	71 42
Mile, standing start.....	41.47 sec.	87.24

These records are instructive in the sense that the great difference between the flying and standing start is emphasized.

In 1910 the Royal Automobile Club undertook to give certificates of car performance to its members. The tests were made on both road and track, and included markings for speed, absence of involuntary stops, wind resistance, gasoline consumption and hill-climbing capacity. A fixed scale of marks of merit was arranged.

Brooklands has always been identified with an elaborate system of standard classification which, up to the early part of 1912, was based on R. A. C. hp. rating (the same as S. A. E. rating). There were six of these classes. During 1912 a new system of classification by cubic capacity was established which consisted of nine classes. The new system did not supersede the other rating classes, and it was possible to enter a car under either or both divisions.

This system of classifications had the effect of making contests extremely close between cars which were similar to each other in essentials, and therefore much valuable data were accumulated. The basic idea back of the cubic capacity classification was that it would give the short-stroke engine equal opportunities with the long-stroke engine which had been developed under the R. A. C. rating.

First Over 100 Miles in an Hour

Undoubtedly the red-letter performance in 1913 on Brooklands track was the establishment of a new world's record by a small Clement-Talbot car which traveled 103 miles 1470 yards in an hour. As a matter of fact, the actual distance covered was approximately 105 miles, as the car was driven outside the timing line, thus adding 70 yd. per lap to the distance for which it was given official credit. Previous figures for the world's 100-mile record were 1 hr., 1 min., 27 sec. In this performance 100 miles was traveled in 57 min. 49.38 sec.

The car which put up these big figures was a four-cylinder of 101.5 x 140 m.m. bore and stroke; equal approximately to 4 x 5½ in. Its power curve showed a practically straight line from 20 h.p. at 500 r.p.m. to 120

hp. at 3000 r.p.m. A year before the best performance of an engine of this size was 87.99 sec. for a flying half-mile—evidence of the great improvement in efficiency.

Three months later a Peugeot, driven by Goux (afterward a winner at Indianapolis), went 106 miles, 387 yards in an hour on the same track. Soon after this a 12-cylinder Sunbeam covered 107.95 miles in an hour.

In the fall of 1913 a 30-hp. Sunbeam established a new world's record for 12 hours on Brooklands, traveling 1078 miles, 460 yards. This car had a six-cylinder engine with a bore of 3.2 in. and a stroke of 5.98 in. The average speed was 89.91 m.p.h.

The particular significance of this performance is its relation to that of the Napier 24-hour record of 1907. In twice the running time of the Sunbeam the 60-hp. Napier traveled only 503 miles farther.

Early in 1914 the big Benz car, formerly driven by Hemery, crowded two miles into a minute on Brooklands track, the first time the feat had been performed on a speedway, although already accomplished on a straightaway in the United States.

Our Contribution

The first endurance run held in this country was from New York to Rochester in 1901. This is usually referred to as the New York-Buffalo event, but owing to the death of President McKinley the contest was stopped at Rochester.

Its experiences taught automotive engineers a number of valuable lessons, as many faults in design were disclosed and inherent weaknesses shown up.

For example, it was shown quite early in the contest that the engines and transmissions had been developed to a higher degree than had the running gear, including the axles, springs, frame, wheels and tires. A number of rear axles and steering pivots were broken and many were bent to a dangerous degree.

Wire wheels were both bad and good. The latter were fully equal to all strains, but some of the former showed serious faults, including warping. Many of the rims were dented out of shape by stone bruises. There were a good many tire troubles throughout the 410-mile course. A number of cars used single-tube tires, and there were several fitted with tires of cushion or non-collapsible type.

Exposed chain drives showed their inability to give efficient service under the adverse weather conditions. Mud and dust combined to render both sprockets and chains ineffective. Brakes gave a good deal of trouble, especially in relation to their want of efficiency in holding on the reverse and when power failed on a grade.

All the vehicles equipped with jump-spark ignition experienced trouble in wet weather, owing to short circuits. The need for completely protected ignition was fully demonstrated.

Unlimited repairs were allowed, and no record was kept of these. This fact largely defeated the immediate objects of the test. An entire disregard of the speed rules was apparently chiefly to blame for the numerous mechanical troubles.

Looking back on this early endurance test, it certainly seems that, in the light of more recent developments, the industry has every reason to rejoice that the cars of 1901 were to a great extent unequal to the calls made upon them by a 410 mile run over what were then considered good roads.

At any rate, the net result of the New York-Buffalo test was to spur the designer to renewed efforts and to help the movement for better roads. Other and later tests were conducted, and results improved steadily as the lessons of the road were taken to heart by car manufacturers.

In 1902 a reliability contest from New York to Boston and return was staged. In this test the increasing reliability of the still new form of road locomotion was well demonstrated. Out of 75 vehicles which started in this run, 68 completed the double journey of nearly 500 miles and conformed in nearly every case to the rule restricting repairs to such as could be made with parts carried on the car and with the aid of available local help.

This was an eminently practical test over all conditions of road, part improved, part deep with ruts and part hilly.

Most of the trouble experienced seems to have been with ignition, but there were many stoppages caused by tire faults. Excess lubrication caused black, smoky exhausts in a number of instances.

Lessons learned in the New York-Buffalo reliability run the year before caused the use of temporary protection sheets of rubber cloth to keep mud away from the mechanism. Pneumatic tires of the detachable variety were used almost to the exclusion of the practically unrepairable single-tube type used before. It should be noted that in the earlier tests the steam car did rather better, as a rule, than did the gasoline-propelled vehicle.

High Spots Where Speed Played a Minor Part

Distance tests for reliability and endurance.
Gasoline economy tests.
Distance tests for pneumatic tires.
Non-skid tests for tires and attachments.
Tests of the amount of dust raised by various body types.
Tests to determine brake capacity.
Hill-climbing tests to demonstrate power.
Accelerometer tests to determine h. p.
Wheel-slip under varying speed conditions.

The third big endurance test, from New York to Pittsburgh, was run in 1902. As in the case of the New York-Buffalo contest, the weather was bad and there were a number of troubles traceable to the muddy state of the roads.

Skidding and loss of tractive effort due to these conditions caused a number of failures, and a number of theories and suggestions were put forward as possible remedies in future events.

Nominally, we started in the racing game in 1895, the same year as France. However, we did not enter into the spirit of the sport, and apart from a few more or less spasmodic efforts, racing languished until the first race for the Vanderbilt cup, held in 1904. This was really the first international race, and foreign cars provided the winner in each of the first three contests. Brief details of the first four races follow:

Year	Distance	Winning Car and Driver	Av. M P.H.
1904	284.4	Panhard, Heath.....	52.2
1905	283.3	Darracq, Hemery	61.4
1906	297.1	Darracq, Wagner	60.8
1908	258.6	Locomobile, Robertson.....	64.3

All these races were run on the roads of Long Island. In later years the venue was changed to Savannah, Ga., Milwaukee, San Francisco. Average speed did not increase appreciably, at least, not sufficiently to be remarked when the varying road conditions were taken into consideration.

However, the Vanderbilt served a useful purpose in demonstrating that cars of American manufacture could hold their own with the best products of Europe, which had hitherto monopolized the honors.

From time to time reliability trials, hill climbs and other contests were held. These undoubtedly proved useful in influencing progression in design, but the varying conditions under which they were held tended to prevent full advantage being taken of performance records. Perhaps the Glidden series of reliability tours were the most spectacular and instructive of these competitions. Interest of manufacturers in these gradually petered out.

After all, it has been on the speedway and on straightaway tests on beaches like Daytona that we have made our records and have tried out our designs. Proof of this is afforded by the table of high speeds reproduced herewith. This table is by no means a complete record, but it marks the high spots both here and abroad.

The Mountain Tops of Speed

M.P.H.	Distance	Record Made at	Year	Car and Driver
150.0	1-kil.	Daytona Beach	1919	Packard, De Palma
149.7	1 mile	Daytona Beach	1919	Packard, De Palma
142.9	1-kil.	Ostend, Belgium	1913	Fiat, Duray
141.7	1 mile	Daytona Beach	1911	Benz, Burman
134.9	2 miles	Daytona Beach	1911	Benz, Burman
127.8	½ mile	Brooklands, Eng.	1909	Benz, Hemery
118.9	2 miles	Brooklands, Eng.	1914	Sunbeam, Chassagne
116.9	5 miles	Daytona Beach	1906	Darracq, Hemery
111.5	2 miles	Chicago	1915	Christie, Oldfield
111.3	10 miles	Sheepshead Bay	1918	Packard, De Palma
103.8	1 hour	Brooklands, Eng.	1913	Talbot, Lambert

Early Attempts at Speed

M.P.H.	Distance	Record Made at	Year	Car
7.5	54 miles	Chicago	1895	Duryea
14.9	740 miles	Paris-Bordeaux	1895	Panhard
15.9	1068 miles	Paris-Marseilles	1896	Panhard
23.0	105 miles	Paris-Dieppe	1897	Panhard
27.3	932 miles	Paris-Amsterdam	1898	Panhard

Indianapolis Speedway, constructed in 1909, was, in its day, the Mecca of all aspiring makers of speedy cars. It was not so fast as Brooklands, England, but nevertheless some very remarkable performances were accomplished before Indianapolis was partially eclipsed by Chicago and Sheepshead Bay speedways.

As first constructed, Indianapolis had a prepared macadam surface. This was not very satisfactory and was speedily replaced with one of vitrified brick.

In 1915 automotive engineers realized the need for speedier tracks and such were built at Chicago and at Sheepshead Bay, near New York. Both tracks are of wood construction, and principal measurements and features are appended to the plans reproduced. The main specifications of Indianapolis and Brooklands are also given.

The history of Indianapolis track is the history of the world-famous series of 500-mile races held each year from 1911 to 1916, dropped because of the war and resumed in 1919.

In perusing the table given below especial attention should be given to the reduction in engine size. To-day the chief trouble at Indianapolis is that the car is too speedy for the track, and in the 1920 race the piston displacement will be reduced to 183 cu. in., the 3-liter class of France.

Indianapolis 500-Mile Races

Year	Winning Car and Driver	Av. M.P.H.	Piston Displacement Limit	Piston Displacement Winner's
1911	Marmon, Harroun....	74.5	600	447.1
1912	National, Dawson....	78.7	600	490.8
1913	Peugeot, Goux	76.9	450	448.1
1914	Delage, Thomas	82.4	450	380.2
1915	Mercedes. De Palma..	89.8	300	274.0
1916	Peugeot, Resta	84.0	300	274.0
1919	Peugeot, Wilcox	87.9	300	274.6

These figures tell the tale clearly. The cars of 1919 were faster than the track, and the race was not so much a test of speed as of preparedness and generalship. It is at present an open question if the 183 cu. in. engine of 1920 will not prove too speedy for the limitations of the track. In the 1919 race the Packard driven by De Palma made a track record of 92.2 m.p.h. to the 100-mile mark. This apparently represents the limit of speed obtainable at Indianapolis with due regard to relative safety.

On the other hand, the first performance on the new Chicago speedway, with its board track and more modern construction, resulted in Resta driving a Peugeot at a clip of 110.1 m.p.h., a world's speedway record for cars of less than 300 cu. in. piston displacement. A few days later this car won the first race on the new track. For purposes of comparison the following data should be considered in relation to the Indianapolis races.

First 500-Mile Race on Chicago Speedway, 1915
(Limit, 300 cu. in.)

Position	Car and Driver	Average M.P.H.	Piston Displacement
1	Peugeot, Resta	97.5	276.0
2	Sunbeam, Porporato	96.5	274.0
3	Maxwell, Rickenbacker....	96.1	298.2
4	Stutz, E. Cooper	94.9	296.8
5	Sunbeam, Grant	94.3	274 0
6	Stutz, Anderson	93.7	296.8
7	Delage, Chevrolet	92.8	298.6
8	Peugeot, Burman	92.2	296.0
9	Duesenberg, Alley	91.3	299.0
10	Sebring, J. Cooper	90.3	299.0

The lesson taught by this race was that engines could be built which would give uniformly satisfactory results at high speeds. Only two cars of modern design suffered from broken parts. Not so long before this the Indianapolis 500-mile race showed a very different state of affairs and so there can be no question but that the lessons learned therefrom had been taken to heart and good use made of the earlier experience.

So far in the history of American automobile racing the foreign-built car had practically swept the field in speedway work. A different tale was told in the results of the 350-mile Astor Cup race at the new Sheepshead Bay speedway.

Astor Cup Race, Sheepshead Bay, 1919

Position	Car and Driver	Average M.P.H.	Piston Displacement
1	Stutz, Anderson	102.6	296.8
2	Stutz, Rooney	102.1	296.8
3	Duesenberg, O'Donnell ..	95.4	297.0
4	Ogren, Alley	92.5	299.0
5	Duesenberg, Henderson..	92.3	298.0
6	Delage, Limberg	84.2	298.0

Here we have an American triumph, for there were three Peugeots and two Delages in the race. We have an averaged speed of well over 100 m.p.h. in a long-distance race and we have Stutz finishing as a team in first and second places. Of the six that finished five were American. All five had to stop for fuel and oil, one had to change a tire and another to replace the spark plugs, but the total number of stops for all was only seven. Limberg's Delage, the only foreign car to finish, had three stops. The early lessons demonstrating the necessity for mechanical reliability had been taken to heart, as demonstrated by results.

During the closing years of the war racing was practically abandoned, but not before its value was demonstrated to the automotive engineer. What the future holds for racing in the light of wartime experience with aviation engines remains to be seen, but what may be expected was indicated by the performance of De Palma at the wheel of a Packard at Daytona Beach, Fla., last February. The following figures speak for themselves:

World's Records Made on Daytona Beach, February, 1919, by an Airplane-Engined Packard

Distance	Time Min. Sec.	M.P.H.
1 kilometer	14.98	150
1 mile	24.02	149.72
1 mile (standing start)	38.83	92.74
2 miles	49.54	145.27
3 miles	1.15.04	145.20
4 miles	1.39.77	144.50
5 miles	2.04.58	144.30
10 miles	4.09.31	144.29
15 miles	6.48.75	132.10
20 miles	8.54.20	134.85

America now holds the distinction of having the fastest thing on wheels, and the limits of automobile speed are not yet in sight. America has compensated to the full for her early disregard of racing as an essential to the successful design of cars, but in a year or so she may have to look to her speed laurels. Europe will undoubtedly revive racing in 1920, and it may be in full swing in 1921. Brooklands track is to be reconstructed, and it will probably be faster than any of our tracks. We have Daytona and other beaches for straightaway tests, but Belgium has Ostend beach.

Various non-competitive records made in 1919 follow:

Non-Competitive

Speedway Records Class "C" Non-Stock

Piston Displacement
161 *to* 183 *Cubic Inches*

Distance, Miles	Time	Driver	Car	Place	Date
1	40.42	O'Donel	Duesenberg	Sheepshead Bay	Nov. 10,1919
2	1:20.32	O'Donel	Duesenberg	Sheepshead Bay	Nov. 10,1919
3	2:00.46	O'Donel	Duesenberg	Sheepshead Bay	Nov. 10,1919
4	2:39.33	O'Donel	Duesenberg	Sheepshead Bay	Nov. 10,1919
5	3:16.58	O'Donel	Duesenberg	Sheepshead Bay	Nov. 10,1919
10	6:14.60	Murphy	Duesenberg	Sheepshead Bay	Nov. 18,1919
20	12:26.14	Murphy	Duesenberg	Sheepshead Bay	Nov. 18,1919
30	18:34.80	Murphy	Duesenberg	Sheepshead Bay	Nov. 18,1919
40	24:49.40	Murphy	Duesenberg	Sheepshead Bay	Nov. 18,1919
50	30:57.40	Murphy	Duesenberg	Sheepshead Bay	Nov. 18,1919
100	1:01:24.20	Murphy	Duesenberg	Sheepshead Bay	Nov. 18,1919
150	1:32:12.60	Murphy	Duesenberg	Sheepshead Bay	Nov. 18,1919
200	2:12:08.80	Murphy	Duesenberg	Sheepshead Bay	Nov. 18,1919
250	2:42:59.40	Murphy	Duesenberg	Sheepshead Bay	Nov. 18,1919
300	3:15:44.00	Murphy	Duesenberg	Sheepshead Bay	Nov. 18,1919

231 *to* 300 *Cubic Inches*

1	30.78	Milton	Duesenberg	Sheepshead Bay	Nov. 10,1919
2	1:01.40	Milton	Duesenberg	Sheepshead Bay	Nov. 10,1919
3	1:31.93	Milton	Duesenberg	Sheepshead Bay	Nov. 10,1919
4	2:02.37	Milton	Du senberg	Sheepshead Bay	Nov. 10,1919
5	2:32.78	Milton	Duesenberg	Sheepshead Bay	Nov. 10,1919
10	5:04.78	Milton	Duesenberg	Sheepshead Bay	Nov. 10,1919
15	7:39.58	Milton	Duesenberg	Sheepshead Bay	Nov. 10,1919
20	10:14.18	Milton	Duesenberg	Sheepshead Bay	Nov. 10,1919
25	12:55.74	Milton	Duesenberg	Sheepshead Bay	Nov. 10,1919
30	15:41.60	Milton	Duesenberg	Sheepshead Bay	Nov. 24,1919
40	21:02.00	Milton	Duesenberg	Sheepshead Bay	Nov. 24,1919
50	26:21.80	Milton	Duesenberg	Sheepshead Bay	Nov. 24,1919
100	52:41.40	Lewis	Duesenberg	Sheepshead Bay	Nov. 24,1919
150	1:19:38.20	Milton	Duesenberg	Sheepshead Bay	Nov. 24,1919
200	1:48:38.40	Milton	Duesenberg	Sheepshead Bay	Nov. 25,1919
250	2:14:49.80	Milton	Duesenberg	Sheepshead Bay	Nov. 24,1919
300	2:44:15.40	Milton	Duesenberg	Sheepshead Bay	Nov. 24,1919

Piston displacement
301 *to* 450 *Cubic Inches*

1	32.49	Lewis	Duesenberg	Sheepshead Bay	Nov. 10,1919
2	1:04.66	Lewis	Duesenberg	Sheepshead Bay	Nov. 10,1919
3	1:37.11	Lewis	Duesenberg	Sheepshead Bay	Nov. 10,1919
4	2:09.46	Lewis	Duesenberg	Sheepshead Bay	Nov. 10,1919
5	2:42.23	Lewis	Duesenberg	Sheepshead Bay	Nov. 10,1919
10	5:14.00	Lewis	Duesenberg	Sheepshead Bay	Nov. 18,1919
20	10:31.40	Lewis	Duesenberg	Sheepshead Bay	Nov. 18,1919
30	15:50.20	Lewis	Duesenberg	Sheepshead Bay	Nov. 18,1919
40	21:12.20	Lewis	Duesenberg	Sheepshead Bay	Nov. 18,1919
50	26:30.60	Lewis	Duesenberg	Sheepshead Bay	Nov. 18,1919
100	33:25.40	Lewis	Duesenberg	Sheepshead Bay	Nov. 18,1919

Hour Records

Speedway Class "C" Non-Stock
161 *to* 183 *Cubic Inches*

98	1 Hour	Murphy	Duesenberg	Sheepshead Bay	Nov. 18,1919
182	2 Hours	Murphy	Duesenberg	Sheepshead Bay	Nov. 18,1919
276	3 Hours	Murphy	Duesenberg	Sheepshead Bay	Nov. 18,1919

231 *to* 300 *Cubic Inches*

113	1 Hour	Milton	Duesenberg	Sheepshead Bay	Nov. 25,1919
222	2 Hours	Milton	Duesenberg	Sheepshead Bay	Nov. 24,1919
323	3 Hours	Milton	Duesenberg	Sheepshead Bay	Nov. 24,1919

301 *to* 450 *Cubic Inches*

111	1 Hour	Lewis	Duesenberg	Sheepshead Bay	Nov. 18,1919

Huron Metal and Its Uses

AN alloy of aluminum, known as Huron metal, is being used extensively in the manufacture of various kinds of automotive machinery. Castings, rolled sheets and forgings are being produced in increasing volume by the Baush Machine Tool Co., who lay particular stress on the metal as a substitute for bronze worm wheels. The claim is made that worm wheels of Huron metal will outlast the bronze variety, although the usual steel worm drive is used to mesh with the wheel.

Among the characteristics of Huron metal are extreme lightness and strength. The specific gravity is 2.82 and the tensile strength approximately 55,000, with an elastic limit of 30,000. In the heat-treated form, the combination of high tensile strength with maximum elongation makes the metal desirable for a variety of uses calling for mild drawing and bending. Bending can be done cold, 180 deg., over a mandrel four times the thickness of the sheet. Hard rolled sheets are supplied if desired, for uses where no bending or forming is required. A spring temper can be produced and maintained indefinitely.

The metal is obtainable in the form of castings, ingots, billets, rods and sheets, and can be cast in sand, permanent moulds, or by any of the usual processes. Castings are compact and homogeneous, and are said to be unusually free from shrinkage cracks, pores, and similar imperfections. The castings machine readily, taking a fine finish.

DURING the war 1,552,256 Americans were given the psychological examination. Of these 24.9 per cent were given the "beta" test. This means that 24.9 per cent could not read and write English well enough to understand a newspaper and write a letter. Of the entire army, the number wholly illiterate was 311,000; relatively illiterate, 712,000; total illiterate class, 1,023,000; literate class, 3,067,000.

HOWARD ELLIOTT, president of the Northern Pacific Railroad Co., stated before the annual convention of the Association of Life Insurance Presidents at New York that railroads need an equipment of $3,000,000,000. If provision is not made for developing railroads continuously, he said, the cost of living will go higher.

Motor Vehicle Registration

This tabulation of State laws as they affect the owner of automotive vehicles movement for uniform legislation. Reading of the fees charged for the operation of trucks reveals a tendency on the part of several rural States charged in Iowa. This tabulation was compiled by the N. A. C. C., and in-

State	Motorcycles	Passenger Cars	Motor Trucks and Commercial Cars	Chauffeurs	Owner Operators	Dealers and Manufacturers
Alabama	$3; with side-car attachment, $5.	Less than 25 h.p., $11.25; 25 to 29 h.p., $18.75; 30 to 39 h.p., $26.25; 40 h.p. and over, $30; electric cars, $20; steam cars, $25.	Less than 1 ton, $15; less than 2 tons, $22.50; less than 3 tons, $37.50; less than 4 tons; $56.25; over 4 tons, $75.	Original, $5; renewal, $2.50.	None	$25 to $125.
Arizona	$2	25 h.p. and under, $5; 26 to 40 h.p., $10; over 40 h.p., $15.	Same as passenger cars	Perpetual, $5	do	1 vehicle of each class at pleasure-car rates.
Arkansas	None	All motor vehicles, $10	do	$1	do	Do.
California	$2	Electric cars, $5; all others, 40c per h.p.; trailers, $2.	Equipped with pneumatic tires, same as pleasure cars; others pay additional: less than 2 tons unloaded. $5; 2 to 3 tons, $10; 3 to 5 tons, $15; over 5 tons, $20.	Original, $2; renewal, $1.	No fee	5 cars, $25, and $2 for each additional; motorcycles, $5.
Colorado	$2	20 h.p. and under, $2.50; 21 to 40 h.p., $5; 41 h.p. and over, $10. One half 1% of cost of car to owner f. o. b. factory, effective Jan. 1, 1920.	1 ton, $10; 2 tons, $17.50; 3 tons, $25; 4 tons, $37.50; 5 tons, $50. Above that $25 per ton or fraction thereof.	$2	None	$20 for first car; $2.50 for others; $30 for first truck; $10 for others.
Connecticut	$2	50 cents per h.p.	¼ ton or less, $11; 1 ton, $15, and increasing to $200 for 8 tons, and $100 per ton for each ton additional.	License, $2; examination, $2.	License, $2; examination, $2.	$50 for 5 pair plates; additiona plates $10 per pair.[2]
Delaware	$5	2 each 500 lb. gross weight of car and load; passengers figured at 125 lb. each.	Same as passenger cars	$3	$3; family, $8	$20 for 2 pairs of tags; extra tags, $10 pair.
District of Columbia	$2	24 h.p. or less, $3; 25 to 30 h.p., $5; over 30 h.p., $10.	do	$2	$2	Regular rates for each car demonstrated on public roads.
Florida[3]	$2	22 h.p., $5; 23 to 27 h.p., $8; 28 to 35 h.p., $12; above, $15. Any car seating more than 10 persons, $100.	1 ton or less, $10; 1 to 2 tons, $25; 2 to 4 tons, $50; more than 4 tons, $100; trailers, over 500 lb. capacity, same as trucks.	$2	None	5 cars, $15.
Georgia	$5	Less than 23 h.p., $11.25; above that, 60c per h.p. Carrying more than 10 persons, 75c per h.p.	One ton, $15; 1½ tons, $22.50; 2 tons, $30; 2½ tons, $37.50; 3 tons, $45; 3½ tons, $52.50; 4 tons, $75; 5 tons, $150; 6 tons, $375; 7 tons, $750; more than that $1,125.	$2	$2	$50.
Idaho	$5	All weighing less than 2,001 lb., $15; 2,001 to 3,000 lb., $20; 3,001 to 4,000 lb., $30; over 4,000 lb., $40.	Same as passenger cars	$2	$2	$35 for one make and $25 each additional make.
Illinois[3]	$4	25 h.p. or less, $8; 26 to 35 h.p. $12; 36 to 50 h.p., $20; over 50 h.p., $25; electric cars, $12.	Less than 5,000 lb., $12; less than 12,001 lb., $22.50; less than 15,001 lb., $35; more than 15,000 lb., $60.	Original, $5; renewal, $3.	Original, $5; renewal, $3.	$12 for 2 plates and $12 for each pair duplicates.
Indiana	$2	Electric cars, $3; others, 25 h.p. or less, $5; 26 to 40 h.p., $8; 41 to 50 h.p., $15; over 50 h.p., $20.	Less than ¾ ton, $6; less than ton, $8; less than 2 tons, $10; less than 3½ tons, $20; less than 5 tons, $30; less than 7½ tons, $40; 7½ tons or more, $50. Ten tons capacity limit	$2	$2	$25; duplicate plates, $1 each.
Iowa[3]	$5	1% of value plus 40c per 100 lb.	One ton or less $15; 1½, $22.50; 2, $30; 2½, $45; 3, $65; 3½, $90; 4, $105; 4½, $120; 5, $135; 6, $165. Solid tires same to 2 tons. 2½, $55; 3, $75; 3½, $100; 4, $115; 4½, $130; 5, $145 6, $175. Fifty dollars per ton above 6 tons.	$2	None	$25; duplicates, $15.
Kansas	$2	All cars, $5 each	do	do	do	$15 for 3 sets of tags; extra tags, 50c each.
Kentucky	$5	Less than 25 h.p., $6; 25 to 50 h.p., $11; 50 h.p. and over, $20.	½ ton or less, $11; 1 ton, $15; increasing to $75 for 5 tons and $50 for each additional ton.	Original, $2; renewal, $1.	do	1 registration for each class at regular rates.
Louisiana	$2	25c per h.p., with a minimum fee of $5 per car.	All motor trucks, $7.50 each	None	do	1 regular registration for each make; second-hand dealers, $10.
Maine	$3	15 h.p. or less, $5; 16 to 35 h.p., $10; over 35 h.p., $15.	Commercial cars, $10	$2	$2	$25 for 5 pairs of plates; extra plates 75c each.
Maryland	$5 Side car, $8.	60c per h.p.; minimum charge, $10; $1.20 per h.p. if operated for hire.	Solid tires to 3 tons capacity $20 per ton; 4 tons, $100, and 5 tons, $150; 6 tons, $300; 7 tons, $500; electrics, over-half of above rates; trailers to 1 ton, $10; above, $20 per ton.	$3	$2	$25 for 2 sets of tags and $12 for each additional set. For dealers in motorcycles, 4 tags, $20; additional tags, $5 each.
Massachusetts	$2	Under 20 h.p., $5; 20 to 29 h.p., $10; 30 to 39 h.p., $15; 40 to 49 h.p., $20; 50 h.p. and over, $25.	Trucks under 1 ton, $5, and $3 for each additional ton.	Original, $2; renewal, $1; examination, $2.	Original, $2; renewal, $1.	$10, motorcycles; $25, motor vehicle and $5 additional for each car over 5 operated on public roads.
Michigan	(4)	Electric cars, $1 for each motor h.p. plus 35c for each 100 lb. of weight; others, 25c per h.p. plus 35c for each 100 lb. of weight.	Electrics, $1 per motor h.p. plus 35c for each 100 lb. of weight; others, 25c per h.p. plus 35c per 100 lb. of weight.	$2	None	$50 for 5 cars and $10 for each additional car.[9]
Minnesota	$5	All cars, $5	Same as passenger cars	Original, $1.50; renewal, $1.	do	$20; extra plates, $1 per set.
Mississippi[7]	State $2; county, $2.10.	State, $2; county, electric cars, $4.80; others, 24c per h.p.	4,400 lb. capacity or less, $6.40; over 4,400 lb., $12.80.	None	do	Regular rates for 4 sets of plates.
Missouri	(1)	Less than 12 h.p., $4; 12 to 23 h.p., $6; 24 to 35 h.p., $10, 36 to 47 h.p., $14; 48 to 59 h.p., $16; 60 to 71 h.p., $20; 72 h.p. and over, $24.	Same as passenger cars	$1.50	None	$10; for each duplicate, $5.

[1] Cars used for transportation of passengers paying fare, 5 or less passenger capacity, $25; 6 to 9 passenger capacity, $40; 10 or more passenger capacity, $60; operating between towns or cities 10 miles or more apart, a flat fee of $40.
[2] In case of manufacturers, $25, plus $1 for each car tested on public roads.
[3] Any county or municipality may charge an additional license tax, not to exceed 50% of State license tax, on motor vehicles used for hire.
[4] Same rate as passenger cars.
[5] In case of manufacturers, motorcycles $20, including 10 number plates.
[6] Both cars and trucks may be registered in municipality in which owner resides.
[7] One-half rate after 4 years.
[8] Effective Dec. 1, 1919.
[9] Effective Jan. 1, 1920.

and License Fees by States

shows graphically the need on the part of the industry for a concerted operation of passenger cars leads to confusion, but the fees charged for the to tax the truck off of the road. In this connection can be noted the fees cludes acts in force Oct. 20, 1919, and some which become effective 1920.

State	Motorcycles	Passenger cars	Motor Trucks and Commercial Cars	Chauffeurs	Owner Operators	Dealers and Manufacturers
Montana	$5	23 h.p. or less, $5; 24 to 50 h. p., $10; over 50 h.p., $15.	One ton capacity or less, $5; over 1 ton and less than 2, $15; over 2 tons and less than 3, $25; over 3 tons, $40.	$2	do	Cars, $50; motorcycles, $15.
Nebraska	$5	Minimum fee $10. 50c per 100 lb. additional over 2,000 lb. Cars rated on capacity load basis.	Same as passenger cars	None	do	Registration of one car of each type
Nevada[5]	25c per 100 lb.	35c per 100 lb.	Same as passenger cars	do	do	$10 for 4 number plates; $1 for each duplicate.
New Hampshire	$2	15 h.p. or less, $10; 16 to 30 h.p., $15; 31 to 40 h.p., $20; 41 to 50 h.p., $25; 51 to 60 h.p., $30; over 60 h.p., $40.	do	Original, $5; renewal, $6.	Original, $3; renewal, $1.	Cars, $50; motorcycles, $5.
New Jersey	$2	10 h.p. or less, $4.50; 11 to 29 h.p., $7.50; 30 h.p. or over, $15.	With solid tires loaded weight ½ ton or less, $6, and $3 additional for each one-half ton gross weight 2 tons, then $4 for each additional ton; trailers, $3.	$3	$3	$5 per car not to exceed 5.
New Mexico[4]	$3	40c per N. A. C. C. h.p.	50c per N. A. C. C. h.p.	None	None	$25. Duplicates, $5.
New York	$2.50	25 h.p. or less, $5; 26 to 34 h.p., $10; 35 to 49 h.p., $15; 50 h.p. and more, $25.	Gross loaded weight 2 tons or less, $10, and $5 each additional ton to 14; 14 tons, $70, and $10 each additional ton.	Original, $5; renewal, $2.	$2	$15, plus $5 for each duplicate set.
North Carolina[3]	$2	26 h.p. or less, $5; 26 to 40 h.p, $7.50; over 40 h.p., $10.	Same as passenger cars	None	do	$10, plus $1, for each duplicate plate
North Dakota	$3	5 mills on cost price, 20c per 100 lb. weight and 10c per h.p.	Same as passenger plus $3 per ton up to 3 tons; $5 per ton from 3 to 4; and $10 per ton above 4.	do	do	$15; extra plates, 50c per set.
Ohio	$2	Electric cars, $3; all others, $5	do	$3	do	$5 each make of motorcycle and $10 each make of automobile.
Oklahoma	(1)	50c per h.p. first year; second 40c per h.p.; third, 30c per h.p.; and thereafter, 20c per h.p.	do	None	do	$15 for 2 tags and $1 each for additional tags.
Oregon	$3	Electric cars, $6; others, 26 h.p. and less, $6; 27 to 36 h.p., $10; 37 to 40 h.p., $15; above 40 h.p., $20.	Electric trucks, $10; others 1½ to 2 tons, $15, and $3 for each additional one-half ton up to 5 tons; over 5 tons allowed only on special permits.	$2	do	$10 for 2 tags and $2.50 for duplicate sets.
Pennsylvania	$3	40c per h.p. Minimum $10	Less than 2,000 lb., 40c per h.p. Up to 3,000 lb., $20; up to 4,500 lb., $25; up to 6,000 lb., $30; up to 7,000 lb., $50; up to 8,000 lb., $75; up to 10,000 lb., $100; more than 10,000 lb., $150. Chassis basis of weight.	$2	$1	$10.
Rhode Island	$2	15 h.p. or less, $5; 16 to 30 h.p., $10; 31 to 40 h.p., $15; over 40 h.p., $25.	Carrying capacity 1 ton or less, $7, with $3 additional for each ton to 4 tons, and then $4 for each ton above 4 tons; over 9-ton capacity, $40 each; trailers, $10 to $30 each.	$1	$1	$25 for 5 vehicles and $5 for each additional vehicle.
South Carolina	(1)	25c per h.p.	Same as passenger cars	None	None	$15 for each make.
South Dakota[4]	$3	All cars $6 each	Two tons or less, $6; 3½ tons, $10; above 3½ tons, $15.	do	do	$25.
Tennessee	(1)	50c per h.p.	50c per h.p. plus $5 per ton carrying capacity.	do	do	$25.
Texas	$3	35c per h.p.	Up to 4,000 lb., $16; up to 6,000 lb., $32; up to 8,000 lb., $48; up to 10,000 lb., $80.	$3	do	$15; extra numbers, $5 each.
Utah	$3	Electric cars, $10; others 25 h.p. and less, $5; 26 to 40 h.p., $10; above 40 h.p., $15.	Solid tires, 1 ton, $10; 2 tons, $15; 3 tons, $22.50; 4 tons, $30; 5 tons, $37.50; 6 tons, $45; 7 tons, $52.50; 8 tons, $60; 9 tons, $67.50; 10 tons, $75. Pneumatic tires, two-thirds of above rate, minimum, $10.	$2	do	$25, and $2 for each set of duplicate plates.
Vermont	(1)	First registration; $1 per h.p.; second, 75c per h.p.; third registration and thereafter, 50c per h.p.	1 ton, $20; 1½ tons $30; 2 tons, $40; 2½ tons, $50; 3 tons, $75; 4 tons, $100. Each additional ton or fraction above 4 tons, $25.	$3	$3	$50.
Virginia	(1)	60c per h.p.	$15 for first ton and $5 for each additional ½ ton.	$5	None	$50.
Washington	$6	1,500 lb. or less $10; more than 1,500 lb., $10 plus 60c per 100 lb.	1,500 lb. or less, $10; more than 1,500 lb. but less than 6,500 lb., $10 plus 40c per 100 lb. at rated capacity load. More than 6,500 lb., $10 plus 50c per 100 lb. Load limitation, 10,000 lb.	Original, $5; renewal, $3.	do	Cars, $50; extra plates, $5 per pair; motorcycles, $10.
West Virginia	$5	Cars weighing 1 ton or less, $10, and 25c additional for each 100 lb. over 1 ton.	Pneumatics same as passenger cars. Solid tires. 1 ton, $15; 2½ tons, $25; 3½ tons, $40; 5 tons, $75; 7 tons, $125. Over 7 tons, $2,000.	$3	do	Cars, $15 per set of plates; motorcycles, $5.
Wisconsin	$4	All cars $10 each	Capacity less than 2,100 lb., $15; 2,100 to 5,100 lb., $20; 5,100 lb. or more, $25.	(2)	do	$25 for 8 plates; extra plates $1 each.
Wyoming[4]	$5	40c per h.p.	75c per 100 lb.	None	do	$50.

[1] Same rate as passenger cars.
[2] Drivers of cars operating for hire may be licensed by municipality.
[3] Counties or municipalities may require a registration fee equal to one-half of the State fee.
[4] Effective Jan. 1, 1920.
[5] Effective Jan. 1. 1920.
[6] Dealer pays initial license.

AUTOMOTIVE INDUSTRIES
The Automobile

PUBLISHED WEEKLY
Copyright 1920 by The Class Journal Co.
Vol. XLII Thursday, January 15, 1920 No. 3

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SUBSCRIPTION RATES
United States and Mexico - One Year, $3.00
Extra postage west of the Mississippi River on account of Zone Postage Law, 0.50
Canada - One Year, 5.00
Foreign Countries - One Year, 6.00

To Subscribers—Do not send money by ordinary mail. Remit by Draft. Post-Office or Express Money Order or Register your letter.

Owned by United Publishers Corporation, Address 239 West 39th St., New York; H. M. Swetland, President; Charles G. Phillips, Vice-President; W. H. Taylor, Treasurer; A. C. Pearson, Secretary.

Entered as second-class matter Jan. 2, 1903, at the post-office at New York, New York, under the Act of March 3, 1879.

Member of Associated Business Papers, Inc.

Member of the Audit Bureau of Circulations.

Automotive Industries—The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907, and The Horseless Age (semi-monthly) May, 1918.

Our Second Statistical Issue

IN handing to you this second annual STATISTICAL ISSUE of AUTOMOTIVE INDUSTRIES we are not going to burden you with either apologies or explanations. In advance of the printing we were quite proud of our work. We know that we have done all that could be done to insure accuracy. We hope that our belief in the accuracy of our work will be proved by the test of use. Some things that were undertaken were not completed because there was a doubt as to the accuracy of the data obtained. We can only promise to work consistently and steadily toward a better issue another year.

But there are some things that are open to discussion. The industry has a big task before it to establish itself in the proper niche. The great commercial and statistical organizations do not properly appreciate our industry, which appears to be safely lodged in second place, next to that occupied by the steel and iron industry. We contend that as a whole our industry must be given more consideration as an industry, and the few persons who look upon it as a "happen so" or an "accident" must be converted to its unique position. Our contention is that the automotive industry ranks first, in that it produces a larger value of indisputably related products than any other industry. The so-called leading industries are in the main those which use raw materials. The automotive industry is not one of these but is purely a manufacturing industry.

The figures in this volume indicate other great needs. Changes are needed in the registration laws. These are entirely unsatisfactory, as there are hardly two States that require the same information from the vehicle owners or that make public satisfactory figures at the same period. It was the general opinion that progress was being made in this direction, but one State has reverted to the country or local registration, never satisfactory as to financial results or the count of vehicles. Some other States still have the plural year registration, which does not make for accuracy of count or control of vehicles. Altogether the registration systems are deplorable and they must be remedied by uniform State legislation which will recognize necessary privileges to vehicles from other States, or by a national law that will make the proper provisions for the increased inter-State traffic that is certain to follow the wider and greater use of trucks. The situation undoubtedly is due to the lack of appreciation by State legislators of the situation involved. The remedy is through education, and every person and firm in the industry should work to reach the ideal.

The tabulation of specifications might be considered worthy of some comment. Perhaps no feature of this book is so greatly appreciated the year through as are these tables. The compilation of these tables is a trial of patience. Some manufacturers are prone to take the attitude that they are being asked a personal favor to give these data. The publisher's view is entirely different. From his viewpoint, these tables are regarded solely as of value to the industry. They make for standardization and lay before the engineer and designer exactly what is possible in an emergency. Also these tables more than any other one feature of the statistics show the great extent of the industry. It is the publisher's belief that the inclusion of specifications in this table is of distinct value to the part or vehicle manufacturer who has something worth while to sell, and inversely, to the manufacturer of any complete product. It will be noted that in all AUTOMOTIVE INDUSTRIES tabulations the scope is open to the industry and no distinctions are made. The facts, as there represented, form the entire case.

We hope that you will find this issue valuable. If you have questions that it does not answer, tell us about them. Preparations for the third annual STATISTICAL ISSUE are already under way and perhaps your question will be a valuable guide to us in laying our plans. So if you have a suggestion, send it NOW.

Politics

IT is interesting to note that only a small proportion of the dinner speakers at the Automobile Show week functions failed to mention the political situation now before this country. It is more pleasing to note that, in the main, these speakers agreed upon a solution of the problems. And further, that none of the speakers expressed any doubt as to ultimate victory of true Americanism.

There was a strong demand in the Show Week oratory for a business government. There was lacking only the declaration for an independent party to bring these speakers into line with the comment that one hears so often now in the quiet conversations of the street or smoking room. Certainly it was clear to all who heard these speakers that for their part they were through with the politicians and the politicians' vote-catching questions. A number of these speakers had been in the country's service during the war and for the first time had learned just how impossible were the methods of government built up by the men who are practical only as vote getters.

If one was to judge by the applause, the leaders of the automotive industry are done with the old line parties, if these parties continue to work within previous lines. It would appear that if the Republican or Democratic leaders are going to lead their hosts to victory, they must prepare by a house cleaning within their own ranks.

Another comment can be made on these speakers. While several of them are known to feel very deeply over some things that happened during the war, none permitted himself to become a carping critic of the administration. There were criticisms, to be sure, but they were criticisms necessary to pave the way for a constructive suggestion, not of the "knocking" sort.

Taking the week's political talk from first to last, we would say that the industry is for a business administration, regardless of party lines.

Education and Propaganda

SOME weeks ago Mr. Tipper wrote, "It is useless to talk of educating the worker unless the executives themselves are educated to a knowledge of his point of view and position." The fundamental trouble with much of the so-called educational and Americanization work in connection with foreigners and workmen in general is the failure of the teacher to have clearly in mind the present ideas of his pupil which must furnish the foundation upon which the instruction must be built.

True education consists in teaching a man enough real facts and pointing out to him all the possible lines of thought so that he may be able, properly, to interpret for himself the events and conditions with which he comes in contact. In the task of "educating the worker" the words "education" and "propaganda" have too often been considered as synonymous. The word propaganda gained ill fame by being so frequently linked with the prefix German during the war; it would be advantageous to our future industrial relationships if that ill fame could still be attached to it when it is substituted for education.

We can never convert the radical, who wishes to overturn society, to a sane view of affairs by merely waving the flag before his eyes and talking to him of loyalty, honor, democracy, etc. Such approaches cause in such a man exactly the wrong psychological reactions; he immediately assumes precisely the attitude which the teacher does not wish him to assume. It is no more possible to convert the radical to belief in the efficacy of our ordinary democratic processes by merely saying to him, "You are a fool, a murderer, an idiot, an undesirable" than to convert the capitalist to anarchism by saying to him, "You are a robber, a blood-sucker, a thief, a baby-killer, and should be blown up with a bomb." The process is ineffective in either case; yet it sometimes goes by the name of education. We usually recognize the ineffectiveness of radical papers which write in this vein, but the beam in our own eye is larger than is commonly supposed.

Democracy is based upon the essential correctness of the will of the majority. Those who believe in democracy, as such, must believe in this essential principle and be ready to abide by it even when it operates in opposition to their own wishes. Now, suppose the teacher first approaches the radical, not by trying to convince him of the utter absurdity of every idea which the latter has in his brain, but by showing him how it is possible, through our regular channels of election, to obtain whatever the majority wishes; by showing him ways and means of proper political organization for the propagation of any ideas; by showing him that facilities are given under our constitution for any organization to attempt to gain the majority of votes for its project.

Having been thoroughly educated, the workman, formerly ignorant of the fundamental opportunities and practical possibilities of our democratic system of government, may later become a fit object of propaganda; better able to comprehend the meaning of loyalty and like terms. The more uncultivated the mind, the less able it is to grasp or become interested in abstract ideas; the seed must first be sown on ground familiar to pupil and teacher alike. The beginnings of education, be it in mathematics or Americanism, should have to do with facts to the exclusion of propaganda. Though such education will not give the teachers the satisfaction of "getting so much off their chest," its results will, in the final analysis, be far more beneficial to the employer, the employee, and the public at large.

Index for Vol. XLI

AGAIN we call your attention to the fact that we were compelled, by printing conditions, to change the arrangement of publishing the index for the last volume of AUTOMOTIVE INDUSTRIES. Instead of printing the index as a part of a regular issue, the index is being printed separately and will be distributed by request. If you have not asked for your copy, send in your request to-day.

Factory Ad Plans May Affect Dealers

Elimination of Free Electrotype and Advertising Matter Is Under Consideration

NEW YORK, Jan. 9—Very beneficial work along advertising lines is promised when the advertising managers of the automobile factories put into execution some of the ideas which developed at the first get-together meeting held Thursday, Jan. 15, in the meeting room of the National Automobile Chamber of Commerce. It was the first time the advertising men of the industry have been together in a section of this kind, and some very important facts were developed. Their main aim seemed to be to make advertising more effective and economical and more valuable for the dealer.

The advertising men did things other than discuss advertising copy and the inspirational side of their work. They got down to real facts and took up the question of eliminating waste and the high cost of advertising. One of the things which came up was the relation of the factory to the dealer as regards the cost of advertising in the dealer's territory. In years gone by it has been the practice of some factories to do practically all of the dealer's advertising, to supply him with electrotype and advertising literature, and almost anything he wanted at no charge whatsoever, with the result that much of this material has been wasted.

It seems to be the opinion among the advertising managers that this material can be given a greater value in the eyes of the dealer and greater assurance of its proper use can be given and some charges made for it. As a general rule, this charge is based upon the cost of material and the cost of handling and the rule is in some cases made to apply to literature that is sent to the dealer's prospect list.

Devise Co-operation Plan

One advertising manager stated that he is operating on a plan which permits the dealer to operate in any way he pleases, the factory taking care of advertising in national medium and the dealer standing all the expense of the local advertiser. The factory makes suggestions to the dealer as to copy, but tells him that if he has anything he considers better he is at perfect liberty to run his own copy. With open-minded co-operative attitude on the part of the factory, a maximum co-operation with the dealers is secured and a good quality of advertising results.

Another thing which came up was the matter of publicity, which is being mailed to publications by the factories, and it is not unlikely that some efforts will be made to study this field more carefully and produce a higher quality along some lines.

On the question of motor truck advertising, a number of good thoughts were developed. The managers seem to be of the opinion that in motor truck advertising the most valuable factors is to stick pretty closely to facts and stick pretty closely to a specific reference as to performance rather than to generalize with the possibility that the reader of the advertising may draw erroneous conclusions with the result that controversies may result because of his interpretation of what the advertisement says.

This first impression of the advertising man proved to be very valuable and other sessions are likely to be held at future dates.

Overland Employees Lose Profit Share

TOLEDO, OHIO, Jan. 9—Announcement was made by the officials of the Overland plant at Toledo that the employees would lose their fifty-fifty share of the last quarter's profits by reason of the strike last summer. In a circular issued to the employees the company announced that there were no profits during the period. The plan of distributing profit-sharing checks to employees was announced in 1918, and there was one distribution, just before the strike, which started last May, in which $414,000 was distributed. The circular carries the information, however, that the plan will be continued and urges elimination of waste in time, labor and materials as the surest steps toward a big distribution at the end of the current year.

FOREIGN OPPORTUNITIES

WASHINGTON, Jan. 9—The Bureau of Foreign and Domestic Commerce, Department of Commerce, has received requests for automobiles or parts agencies of business from individuals and companies in foreign countries. These are listed below. For further information address the bureau of Foreign and Domestic Commerce and specify the Foreign Trade Opportunity number.

A firm in Spain with garage and store desires to receive catalogs and price lists of automobiles and accessories, bicycles, motorcycles, tires, etc., with a view to securing exclusive agencies. Correspondence and catalogs may be in English, but Spanish is preferred. 31625.

An American trading company with branches in the Netherlands, Germany and France desires to secure an agency from manufacturers for the sale of automobiles, bicycles, motorcycles, automobile sundries and tires. References. 31563.

A company in Ireland, which is now building a public garage and repair shop, desires to purchase and secure an agency for the sale of garage equipment and automobile accessories. Reference. 31673.

A merchant in Switzerland desires to purchase and also secure an agency in bicycles and motors. Correspondence should be in French. Reference.

An importer in Belgium desires to secure automobiles, accessories and tractors. Reference. 31678.

S. A. E. to Inspect Sub. "U-117" Engine

PHILADELPHIA, Jan. 10—The Metropolitan and Pennsylvania sections of the Society of Automotive Engineers, in a joint meeting at Philadelphia Jan. 22, will inspect a 1200-hp. Diesel engine taken from the U-boat "U-117," at the Philadelphia Navy Yard.

This engine is said to be the most efficient of its type in existence and marks the highest stage in development of submarine power plants. The navy yard engineers have set the engine up on a specially constructed test stand, and will run a series of exhaustive tests to determine what features of construction are the basis of the great power and efficiency.

The engine and the tests are of vital importance to engineers because of the increasing tendency toward the use of Diesel engines in seagoing vessels. Its chief features are great power, use of a heavy oil fuel, ability to carry fuel for long voyages and ease of operation and maintenance. German development in the Diesel field was forced ahead because this type of engine is best suited to submarine craft, but it is expected that a study of the engine from the "U-117" will disclose the secrets of its development to American engineers.

Subsequent to the inspection at the navy yard, the engineers will attend a banquet. At the joint meeting later Hubert C. Verhey, engineer in charge of Diesel work with the Emergency Fleet Corp., will deliver a lecture on the Diesel engine, covering its development and possibilities.

Tractors and Trailers Draw Show Visitors

NEW YORK, Jan. 9—The permanent exhibit of tractors, trailers and farm implements on the seventh floor of the Grand Central Palace, on the first four floors of which the New York national automobile show is being staged, reports some real business in the first few days of the big show.

The exhibit is part of the International Exposition of Industries operated by the Merchants and Manufacturers Exchange of New York. It is not connected with the automobile show in any way, but, being housed in the same building, is drawing many visitors. Within the last week a business of $250,000 was reported by W. W. Mawby, manager, much of which was with foreign buyers.

Among the manufacturers showing machinery in this exhibit are Advance-Rumely, Avery Co., J. I. Case Plow Works, Chicago Steel Post, Craine Silo, Detroit Trailer, General Ordnance, Holt, International Harvester, Northway Trailer and Ohio Trailer.

ALBANY SHOW DATE SET

ALBANY, N. Y., Jan. 9—The annual automobile show of the Albany Automobile Dealers' Association will be held in the State Armory, Feb. 20 to 27,

Optimism Rampant As Parts Men Meet

Motor and Accessory Manufacturers' Assn. Plans Extensive Program for 1920

NEW YORK, Jan. 9—Co-operative effort with makers and dealers to eclipse the wonderful record made by the automobile industry in the past year was pledged by the Motor and Accessory Manufacturers' Association at the annual sessions held here this week.

President Charles E. Thompson, in his annual address, sounded the keynote for 1920 and congratulated the association and its individual members on the accomplishments of the year. He warned that quality must go hand in hand with quantity and expressed the conviction that the members of the association would remain steadfast in their insistence on the maintenance of the American standards of quality, service and specialization.

President Thompson pointed with pride to the team-work of the association with the Society of Automotive Engineers, National Automobile Chamber of Commerce, Rubber Association, Highways Industries Association, and the various dealer, jobber, trailer, truck and tractor manufacturers' groups and associations. Through these alignments, he said, the parent body had accomplished much that would have been impossible without concerted effort. As instances of the benefits to the industry through this co-operation he cited: The program of standardization of the bushings manufacturers, and the effort of the magneto manufacturers to relieve the shortage of platinum points.

In the recitation of the association's activities during the past year, President Thompson spoke of the co-operation with the government in the sale of surplus material; the adjustment of war claims and contracts; co-operation with the Bureau of Standards; and the research study and investigation of the German motor trucks. These, he said, were typical examples.

Co-operate in 1920 Program

The members of the association came to New York brimfull of optimism. Co-operation during the war had broadened their vision and they were prepared to join heartily in the greater program that is set for them for 1920.

They realized that the quantity and quality of the 1920 automobile production depends to a large extent upon their efforts. They are determined to turn their January, 1920, optimism into December, 1920, accomplishment.

All of the sessions were largely attended. The banquet, in the Grand Ballroom of the Hotel Commodore, was the most brilliant function in the history of the association.

The election of officers resulted in the selection of many of the leaders of 1919 for another term, but a few new faces will appear in the councils.

The new officers are:

President C. E. Thompson, president of the Steel Products Co., Cleveland.

First Vice-President, E. H. Broadwell, vice-president of the Fiske Rubber Co., Chicopee Falls, Mass.

Second Vice-President, Christian Girl, president of the Standard Parts Co., Cleveland.

Third Vice-President, W. O. Rutherford, vice-president of the B. F. Goodrich Co., Akron.

Treasurer, L. M. Wainwright, president of the Diamond Chain & Mfg. Co., Indianapolis.

Secretary and Assistant Treasurer, G. Brewster Griffin, manager of the automobile equipment department of the Westinghouse Electrical Mfg. Co.

General Manager, M. R. Heminway.

General Counsel, S. S. Meyers.

All of the officers were re-elected except Griffin, who succeeds T. J. Wetzel.

New Directors Chosen

The new Board of Directors consists of the following: W. O. Rutherford (re-elected), E. E. Allyne, president of the Aluminum Castings Co., Cleveland; J. M. McComb, assistant treasurer of the Crucible Steel Company of America, Pittsburgh, and G. Brewer Griffin. The recently elected directors replace C. W. Stiger, president of Stromberg Motor Devices Co.; J. H. Foster, president Hydraulic Pressed Steel Co., Cleveland, and T. J. Wetzel, of the Precision Die Castings Co.

On the standing committees the following choices were made:

Executive—C. E. Thompson, E. H. Broadwell, Christian Girl, W. O. Rutherford, E. T. Hammond, G. B. Griffin and A. W. Copland.

Finance—E. H. Broadwell, C. E. Thompson, C. Girl, W. O. Rutherford, G. W. Yeoman and J. M. McComb.

Show and Allotment—C. Girl, G. W. Yeoman, W. O. Rutherford, G. B. Griffin and D. E. Allyne.

Auditing—C. E. Thompson, G. B. Griffin and L. M. Wainwright.

Membership—E. W. Beach and L. M. Wainwright.

Banquet—W. O. Rutherford, C. Girl, G. W. Yeoman, E. T. Hammond and J. M. McComb.

NEW MINERVA ENGINE

NEW YORK, Jan. 10—The Minerva Engine Co., Cleveland, is building a new type of gasoline engine, the invention of R. K. Johnson, mechanical engineer. The engine is designed for heavy service work on trucks and tractors.

TEXAS SHOW SPACE SOLD

SAN ANTONIO, TEX., Jan. 9—The Lone Star Automobile, Truck and Tractor Building has been selected as the place for holding the annual automobile show of the San Antonio Automobile Trades Association. The show will be held from Feb. 14 to 22, and will be under the direction of W. A. Williamson. All space for the exhibit has already been taken and 164 cars, trucks and tractors will be displayed.

N. A. C. C. Dinner Largely Attended

George M. Graham Speaker at Annual Show Week Event —Sketch Given

NEW YORK, Jan. 10—The National Automobile Chamber of Commerce held its annual banquet in the ballroom of the Hotel Commodore, Tuesday evening, with one of the largest crowds that any of the show dinners has drawn. Between seven and eight hundred people were present The feature of the evening was an address by George M. Graham, of the Pierce Arrow Motor Car Co., who held his audience in a state of intense interest for an hour. Graham was both serious and humorous. He made various funny references to individuals and the experience of the industry during the late emergency, and aroused great applause by setting forth some of the ideals of business in relation to Government.

Following Graham's address, a company of amateur performers put on an amusing sketch built upon the painting of the Courts of Old King Cole which hangs in the much-remembered barroom of the Knickerbocker Hotel. Throughout this performance humorously sarcastic references were made to various individuals in the industry and medals of honor of a semi-humorous, semi-serious nature were presented on the platform by "Judge" Alfred Reeves to Col. Charles M. Clifton of the Pierce Arrow Motor Car Co., president of the association; John N. Willys and J. D. Dort.

Liberty Engine on Show in Washington

WASHINGTON, Jan. 9—A Liberty engine, made by the Lincoln Motor Co. of Detroit expressly for the Smithsonian Institution, has just been installed in the Arts and Industries Building of the National Museum, and for those who are not familiar with the construction of an airplane engine the opportunity is now offered to inspect the mechanism, with a section cut away to show the working parts in operation and their relation to one another. Otherwise, it is the standard aircraft engine used by the army and navy.

The interior parts of the engine thus revealed include the cam shaft and rocker arm workings and bearings; cylinder showing water jacket and cylinder proper, piston rod (upper end), bearings and piston rings, crankshaft with oil passages to bearings. In addition the water pump, oil pump, air pump and synchronizer are cut away, showing the workings in detail.

The engine is so mounted that the observer may have a clear view of all these cut-away sections.

Complete, the engine weighs 885 lb., developing 420 hp. at 1700 r.p.m. There are 12 steel cylinders, having 5-in. bore and 7-in. stroke, giving a total piston displacement of 1650 cu. in.

To Take Census of British Production

Statistical Society Points Out Lack of Information—Last Census in 1907

LONDON, Dec. 24 (Special Correspondence)—The government has ordered a census of production to be taken in 1921, and it will comprehend all persons, companies and firms employing on an average more than five persons, exclusive of the office or management personnel. The motor and cycle industries are included in the trades scheduled for this report. The last census of production was taken in 1907, and is supposed to be taken every seventh year, but the war intervening caused it to be postponed.

Apropos of this it may be added that a memorial has been presented to the government by the Royal Statistical Society, and well backed by public bodies, pointing out the paucity and lack of statistical information of the sort required for comparative and other purposes relative to British industries, etc. Following are examples of the lack of information referred to:

No general information as to wages since the incomplete census of 1906; no information as to the number or income of persons who neither earn wages nor are liable to income tax; statistics of home production are very incomplete; railway traffic statistics are so meager that they are useless either as index of the trade of the country or for the purpose of international comparison.

The trade between England and Ireland is imperfectly known; no official statement of the number of trained seamen in the British mercantile marine; the number and class of houses available cannot be accurately ascertained; information with regard to food, clothing and other necessaries is almost entirely wanting. ENGLISHMAN.

Detroit May Adopt Gas Trolley System

DETROIT, Jan. 9—Henry Ford's gasoline street car may be the solution to Detroit's transportation problem.

In sending to the city council a message asking an ordinance for a bond issue of $15,000,000 to establish a street car system, to be voted on by citizens in April, Mayor James Couzens declared it was possible the Ford car would be used. Experiments have proved the gas car no longer is a dream, and Ford submitted figures to the mayor showing an annual saving in operating cost of $909,647 on the present mileage basis by the use of his car.

Ford's figures show that the cost of operation of the gasoline-driven car would be 31.41 cents a car mile, whereas the figures submitted by the company for operating the present electric system were 33.08 a car mile. Mayor Couzens also told the council in his message the original cost of the gasoline car would be 50 per cent less than that of the cars equipped for electrical operation.

Passage of the ordinance is certain and ratification is assured the plan for the municipally-owned system, which will relieve present congestion and serve wide territory now without street cars. The consensus appears to favor giving the Ford gas car a trial though that question will be left until after the election.

Willys Co. Tells of British Plans

DETROIT, Jan. 9—Formation of the Willys-Overland-Crossley Co. to build 25,000 Overland automobiles in England every year has been completed, facts in connection with the deal having been made public by Edwin B. Jackson, vice-president of Willys-Overland, who returned recently from Europe. The first European expansion plans of the Overland were worked out during Jackson's visit to England, whereby a financial and working alliance has been made with the Crossley Motor Works, Ltd., for the production of Overlands by American process and British labor.

American foremen will be used for the time being in the English factory as will also American parts. The new company will have a capital of 2,000,000 pounds sterling, approximately $10,000,000. Jackson said labor conditions in Britain were being shaped up rapidly and therein he sees opportunity for great aid in immediate production on a large scale.

FORM KENTUCKY ASSOCIATION

LOUISVILLE, KY., Jan. 9—With a capital stock of $3,000, divided into $10 shares and authority to incur liabilities of $100,000, the Kentucky Automotive Trade Association filed articles of incorporation yesterday.

The corporation was formed for mutual protection and advancement of members engaged in the motor business in Louisville and Kentucky.

H. A. Collins, S. E. Hubbard and Arthur Weber are the promotors, each holding three shares of stock.

ENGINEERS' CARNIVAL

NEW YORK, Jan. 10—Wednesday night was play time for the automotive engineers. In place of the annual frolic which has featured ladies' night of the convention, a carnival was staged at the Astor. Three hundred engineers and their wives were introduced to an old-time fair wherein stage money was the only medium of exchange. Games of skill and chance with all the atmosphere of the western mining towns were followed by a dance.

OPERATE IN TURKEY

WASHINGTON, Jan. 10—A British automobile company with a capital of about $2,000,000 is to operate in Turkey, represented by General Long of the British army, now retired, who is in the Near East. The company will operate taxicabs, omnibuses and trucks.

Franklin Dealers Hear of New Truck

NEW YORK, Jan. 9—More than 250 Franklin dealers at the recent conference and luncheon at the Commodore Hotel applauded the plans of the manufacturer for 1920.

They were particularly interested in the announcement of the new 1-ton truck, which is to be put on the market within a year. The new job, they were told, is to embody many of the features of the Franklin passenger car, including the air-cooled engine and wooden chassis frame. The use of the wooden frame in truck construction is calculated to make the Franklin truck considerably lighter than the trucks of the same capacity now on the market. The car is being designed for pneumatics. The new truck was described by J. L. Yarian, who designed it. He said that he expected to have experimental trucks on the road by April 15.

Among the speakers were John Wilkinson, designer of the Franklin car; S. E. Ackerman, salesmanager; H. H. Goodhart, advertising manager; Ralph Murphy, chief engineer; Otto Lawton, Boston dealer; Ralph Hamlin, Los Angeles, dealer, and James Sweeten, Philadelphia dealer.

It was announced at the conference that P. E. Frost, Portland, Me., dealer, and Sawyer Bros. of Bangor, had just completed a run of 972 miles from Boston to Fort Kent, on the International line, and return, in 24 hr. 45 min. Dealers in other parts of the country were encouraged to make similar runs to demonstrate the high mileage attainable by their products.

Concede Points in 44-Hour Controversy

LONDON, Jan. 5 (*Special Correspondence*)—Conference between representatives of employers and employees on the 44-hr. week assumed a more hopeful tendency recently, when the union representatives agreed to waive their demand for an independent chairman of the joint committee which is to investigate the economic effect of reduced working hours, and also the demand that the committee should comprise six members of the affiliation and six representatives of the employers' side.

Would Radiate All Roads from Capital

WASHINGTON, Jan. 10—A monument will be erected on the north side of the Ellipse and south of the White House at the point where the overland motor truck convoy started its journey to San Francisco last summer, if a resolution introduced by Congressman Julius Kahn of California is passed in Congress. The proposed monument would be known as the Zero Milestone and be the radius for all road mileage in the United States. It would be first approved by the Commission of Fine Arts.

Report Ford Co. to Annex Glass Plant

Inspection of Toledo Plant Said to Be Preliminary to Move

DETROIT, Jan. 10—Reports that the Edward Ford Plate Glass Co. of Toledo, Ohio, soon will be announced as the latest addition to the Henry Ford interests, followed an inspection trip to the Toledo plant by Ford and his son Edsel and the announcement immediately afterward that improvements to cost $600,000 would be made.

None of the Ford Motor Co. officials would admit the manufacturer had taken over the glass plant, dismissing the query with the statement that he had visited the Toledo property to look over the possibilities of the plant for supplying the huge demand for glass for Ford cars. Officials, however, recalled Ford's announced determination eventually to manufacture every part that goes to make up a Ford car, virtually an admission that he had decided to include the Toledo plant among his holdings.

Despite the fact of the similarity in names, the Fords in the Toledo company are not related to the Detroit manufacturer and up to the present he had been in no way connected with the company, according to officials. The Edward Ford Plate Glass Co. is located at Rossford, a Toledo suburb, and the proposed improvements will mean 600 additional employees. Plant No. 1, which closed down in 1914 on account of difficulty in obtaining supplies, due to government demands, again will be in operation by April.

With the proposed improvements to plant No. 2 the capacity of the factory will be increased by 8,000,000 sq. ft. The present production of 9,000,000 sq. ft. of glass annually will be doubled. Contracts for 45 new houses have been let to care for the new employees. The payroll, with the increased force, will approximate $1,000,000 a year.

To Test What Cars Can and Cannot Do

DETROIT, Jan. 9—The many questions arising in court trials of automobile and truck drivers affecting culpability prompted Police Commissioner Inches of Detroit to stage a series of tests in stopping and starting cars, turning corners and in all operations of motor vehicles that figure in trials. The charge of a policeman that one driver was turning a corner at a rate of 40 miles resulted in the judge dismissing the accused on the ground that the policeman was in error, inasmuch as the offense charged was impossible. The possibility of making the turn at the speed charged is to be included in the tests.

Inches called in Capt. William Galbreath of the automobile club and Oscar Coolican of the Detroit branch of the Packard Motor Car Co., and the tests were planned to cover various periods in order to cope with the varied weather and atmospheric conditions. A Packard twin-six was selected for the tests and the resulting records will be used as authority to guide the courts in the trial of alleged reckless drivers.

Protest Sales of Trucks in Germany

WASHINGTON, Jan. 9—German automobile manufacturers are protesting, according to reports received here, against the importation into Germany of 16,000 American motor trucks which the Motor Transport Organization Co., Ltd., of Coblenz, an English concern, plans to sell in Germany. The German manufacturers state that there is no need for American trucks, as there are ample quantities of German trucks on hand and if given the necessary rubber tires and other equipment they can meet all demands.

Increase Admission Rate to Boston Show

BOSTON, Jan. 9—In line with the suggestion of the National Association of Automobile Show Managers, admissions to the Eighteenth Annual Boston Show, March 13 to 20, are announced as 75c., including war tax. The show will be in the Mechanics Building and will be under the auspices of the Boston Automobile Dealers Association, Inc., and the Boston Commercial Vehicle Association, Inc. Chester I. Campbell is general manager.

WOULD ADD DUTY

WASHINGTON, Jan. 10—Tariff duties would be imposed on crude chrome ore and chromium ores in order to obtain revenue and protect and encourage chrome ore production in the United States, if a bill introduced into the Senate by Senator McNary is passed by Congress. The tariff duties stipulated include 60 cents per unit of CR_2O_3, 11½ cents for each pound of metallic chromium for ferrochrome and other metallic alloys containing chrome and 90 cents per unit on chemical compounds containing chrome. These tariffs are to be imposed in addition to any tariffs now in force.

ARRANGE MAINE SHOW

PORTLAND, ME., Jan. 9—The annual automobile show of the Portland Automobile Dealers' Association will be held March 1 to 3 in the Portland (Me.) Exposition Building. The exhibit will be under the management of Howard B. Chandler, secretary of the association, making the sixth of which he has been in charge.

The Portland show is the only one of special size held annually in Maine and draws attendance from all parts of the State. This year's show will be a combined automobile, truck and equipment exhibit.

Steinmetz to Make Long-Expected Car

Electric for Which Trade Has Watched for Years to Be Made for Commercial Use

NEW YORK, Jan. 13—After a wait of several years for a "Steinmetz electric," such a vehicle, invented by Dr. Charles P. Steinmetz, is about to make its appearance. Dr. Steinmetz, who is chief consulting engineer for the General Electric Co., Schenectady, is recognized as one of the world's greatest electrical men, and the expectation that he would produce a "new" electric followed remarks he made some years ago at a convention to the effect that the electric vehicle, properly built, could compete with the gasoline car.

In his new car, which will be for light delivery and industrial plant use, he has eliminated excessive weight, increased the "live load" carrying capacity, increased the operating radius and reduced operating cost.

To make this vehicle the Steinmetz Motor Car Corp., with executive and sales offices in the Ziegler Building, 512 Fifth Avenue, New York City, has been chartered under the laws of the State of Maryland with a capital of $2,000,000. The cars are the invention of Dr. Steinmetz, who will act as consulting engineer to the Steinmetz Motor Car Corp., and as a member of its board of directors. The company has acquired a manufacturing plant in Baltimore.

The officers of the Steinmetz corporation are: A. Robert Elmore, president; J. P. Story, Jr., vice-president and treasurer; Nelson H. Truett, secretary. The board of directors includes: Herbert A. Wagner, president, Consolidated Gas, Electric Light & Power Co., Baltimore; William F. Ham, president, Washington Railway & Electric Co., Washington, D. C.; Lindsay Hopkins, banker, director, American Hide & Leather Co., vice-president and director, Santa Cecelia Sugar Co.; Guy Scott, president, Continental Trust Co., Washington, D. C.; J. P. Story, Jr., of Story & Cobb, Washington, D. C., director, American Hide & Leather Co., director, Commercial National Bank, Washington, D. C., and Dr. Steinmetz.

ORGANIZE RACINE AXLE CO.

RACINE, WIS., Jan. 12—The Racine Multi-Power Axle Co. has been organized at Racine, Wis., with a capital stock of $12,000 to manufacture axles, transmissions, steering gears and other parts for the automotive industries. The incorporators are Robert S. Preble, James E. Shine and M. E. Walker, attorney, all of Racine.

CAPITAL INCREASED

The Packard Tire Stores, Inc., Milwaukee, State distributer of the McClaren and J. & D. tires, has increased its capital stock from $50,000 to $100,000. Horace A. Packard is president.

Timken to Enlarge Parts Production

Increased Capitalization to Provide for Additions to Factory and Expansion

DETROIT, Jan. 10—When it was announced a few weeks ago that the Timken-Detroit Axle Co. was increasing its capital it became rumored that the company proposed to consolidate with other interests or to sell its assets. Reports to that effect are erroneous, according to the company's announcement. There is no intention of consolidating or selling to any new interests.

The increase in capital was authorized for the purpose of providing sufficient capital to take care of the rapidly growing demand for Timken-Detroit axles. It became quite apparent early in last year that it would be impossible for the company to supply the demands of its customers, but plans were formulated for increasing the output as rapidly as physical limitations would permit. So buildings were started and machinery ordered in June, and the decision made to increase the capital.

Of the capital authorized $5,000,000 preferred has already been sold, and over $2,000,000 of the cash has been invested in plants and equipment.

A meeting was held in Canton, Ohio, Jan. 5, at which the board of directors, as follows, was elected: H. H. Timken, chairman; W. R. Timken, A. R. Demory, H. W. Alden, Fred Glover, Heman Ely and Austin Lynch. They in turn elected the following officers: H. H. Timken, chairman of the board; A. R. Demory, president; H. W. Alden, vice-president; Fred Glover, vice-president and general manager; C. W. Dickerson, vice-president and secretary; C. G. Rowlette, treasurer and assistant secretary; P. W. Hood, sales manager, and F. H. Maisonville, director of purchases.

At this meeting it was decided that expansion on a much larger scale would be made during 1920 to provide for at least 50 per cent increase in output in 1921. Not only will the output be greatly increased, but it was decided that the company would produce, in its own factories, still more of the important materials which enter into its product, having in mind greater efficiency and reduced costs. It has been the fixed policy of the Timken-Detroit Axle Co. to have at least two sources of supply for all of its requirements, in most cases one source to be its own factories, the exceptions being raw materials and Timken roller bearings. The Timken Roller Bearing Co. is now operating two separate and distinct factories to provide insurance against accident at one of the factories.

CUT DETROIT THEFTS

DETROIT, Jan. 9—Automobile thefts in 1919 were 35 per cent lower than in 1917, according to the annual report of the Detroit police department, though an increase of 24 per cent was shown over 1918. Recoveries by the police amounted to 77.80 per cent, the percentage of recoveries in December reaching 91.1. Thefts of 3482 motor vehicles were reported during the year, valued at $3,165,327, and 2709, valued at $2,697,689, were recovered, leaving 773 unaccounted for.

Petroleum Flow in Year, 376,000,000 Bbl.

WASHINGTON, Jan. 9—Preliminary estimates made by the United States Geological Survey, Department of the Interior, indicate that the production of petroleum in the United States in 1919 was approximately 376,000,000 bbl., an increase of 20,000,000 bbl. over the production in 1918. The stocks of domestic petroleum held by producers and marketing companies at the end of 1919 are estimated at 132,000,000 bbl., an increase of 10,000,000 bbl. over the stocks so held at the end of 1918. The excess of imports over exports in 1919 amounted to approximately 47,000,000 bbl.

M. A. M. A. Dines Without Speeches

NEW YORK, Jan. 10—The twelfth annual banquet of the Motor and Accessory Manufacturers' Association at the Hotel Commodore, Jan. 7, followed the precedent of a number of years and was entirely devoid of speeches. About 500 people assembled in the ballroom, and after dinner spent a couple of pleasant hours watching a vaudeville performance given by performers from the New York theaters. There were numerous "digs" at members of the association and a moving picture film of short duration which set forth some of the aims, objects and achievements of the organization.

INDIA POSTAL RATES

WASHINGTON, Jan. 10—Ordinary letters to India require a 5-cent stamp. Consul Richardson calls attention to the fact that many letters insufficiently stamped have recently been received in Karachi from American business houses, in response to trade opportunities. It is suggested that greater care be taken to prevent the necessity of the penalty payment at the Indian end, which is double the amount short.

SHOW MANAGERS LUNCH

NEW YORK, Jan. 12.—Those members of the National Association of Automobile Show Managers who attended the New York show this week ate lunch Wednesday noon as guests of the New York Automobile Dealers' Association in the association club rooms at 1845 Broadway. Fifteen men were present.

RICHMOND SHOW SET

RICHMOND, VA., Jan. 9—Richmond's annual automobile show will be held March 1 to 6 in Grays' Armory under the auspices of the Richmond Auto Trade Association, Inc. The show will be under the management of J. A. Kline.

Mail Plane Makes Non-stop Record

WASHINGTON, Jan. 9—American flying records for non-stop flights of more than 200 miles were broken to-day, according to a report from the Air Mail Service, when the mail plane flying between Cleveland, Ohio, and Bellefonte, Pa., traveled 215 miles in 83 min. This is at the rate of 156 m.p.h. and is seven minutes better than the same flight made last September. The plane left Cleveland in a raging snow storm.

The Air Mail Service is having some trouble because of the extreme cold, which freezes up the ships and makes it impossible for them to leave the ground. This they claim is due to the fact that the airplane manufacturers are refusing to follow the Post Office Department's recommendation to house in the engines completely for severe winter flying.

Harper-Bean Plans Aluminum Supply

LONDON, Dec. 23 (Special Correspondence)—At an extraordinary general meeting of the Birmingham Aluminum Casting Co., Ltd., last week, sanction was obtained for an issue of 100,000 new ordinary shares to the Harper-Bean Co. for a cash payment of $1,500,000. The object is to insure to the latter company a steady supply of aluminum castings for a weekly output of 2000 chassis, but without prejudice to the Aluminum Casting Co.'s other trade; the company also, it was announced, having bought the business of the Midland Motor Cylinder Co. at Smethwick, where new works will be built.

ENGLISHMAN.

NEW MICHIGAN CHARTERS

DETROIT, Jan. 9—New charters granted by the Michigan secretary of state include the following automotive industries:

Raymond Garage Equipment Co., Adrian, $500,000, to manufacture and sell visible gasoline stations, storage tanks and automobile equipment. W. Hal Marshall, president.

The Bradfield Co, Detroit, $10,000, general advertising, exploitation, advertising writing; H. C. Bradfield, president.

Advance Pattern & Production Co., Detroit, $50,000, manufacture, sale and acquisition of machines, jigs, patterns, dies, foundry supplies and tools; Frank J. Waldecker, president.

Munising Motor Co., Munising, $75,000, to deal in automobiles, motor boats and supplies; M. A. Doty, president.

Saginaw Stamping & Tool Co., Saginaw, $75,000, general tool and machine stamping business; Alex R. Pribil, president.

Holland Trailer & Body Co., Detroit, $5,000, to manufacture and deal in and repair trailers and bodies; Joseph Holland, president.

The Tisch Auto Supply Co. of Grand Rapids was granted permission to increase its capital from $50,000 to $300,000.

Survey of 1920 Shows Vast Factory Production Schedule

Greatest of All Automobile Years Will Witness Gigantic Output of Cars by All Leading Manufacturers. Fords Alone Plan 1,000,000 Production

DETROIT, Jan. 12—Confidence in the future of the automotive industry is reflected in the plans for the expansion of factories. Careful survey of the field will fail to reveal one manufacturer who would sanction a retrenchment policy or will be found willing to sit steady and content himself with the present-day program. Alterations and additions that will permit of doubling and trebling the factory output is the rule, and the financial plans of many of the leaders contemplate a combined total that is staggering.

Chief among them, of course, is the plan of the General Motors Corp., the stockholders of which voted to increase the capitalization to $1,000,000,000, constituting the largest individual corporation in the world with the exception of United States Steel.

Ford Plans 1,000,000 Cars

Some idea of the vastness of the plans outlined for 1920 production is furnished in the reports issued by leaders in the industry in the Detroit territory. The Ford Motor Co., with an output of 800,000 cars in Detroit and the Canadian plant just across the river, has set 1,000,000 as the goal to be reached in the two plants in 1920.

Buick Motor Co., during the fiscal year ending June 30, 1920, will have produced 140,000 automobiles, unless something unforeseen interferes to halt the present product of approximately 550 each day. Plans for the next fiscal year call for 280,000, exactly double the output of the current year. Two additions to the Buick plant at Flint, Mich., now are in course of construction and others are contemplated, all designed to give increased capacity for working out plans of progressive assembly with speed as the keynote.

Willys to Build 200,000

Willys-Overland with a production record of 75,000 cars in 1919 has scheduled an output of 200,000 cars during the current year. The Overland production was hampered seriously by labor trouble last summer, that, together with the transition from 100 per cent war work and the development of two new models, decreased the total materially. The company has purchased a large tract of land at Elyria, Ohio, and will erect buildings that will permit of the doubling of the production of Knight cars. The company will continue to produce the Knight and Overland Four and plans are rapidly being completed for a Six to be built in Michigan by a company practically a unit of the Willys organization, though details of the plan have not been made public.

Hudson Motor Car Co. and Essex Motors completed their 1919 schedules of 20,000 of each model despite delays due to fuel shortage, the steel strike and other unavoidable interruptions. The 1920 mark set for production of the Super Six is 30,000, while 40,000 Essex cars will be manufactured during the same period. During the last year $2,250,000 has been expended in acquiring additional land, the erection of new buildings and plant equipment and machinery, making possible the increased output for 1920. The companies now occupy territory aggregating 71 acres and have a floor space of 1,300,000 sq. ft.

Paige Plans 37,000 Output

Paige production in 1919 was 15,776 cars, and the schedule for the current year is 37,000. This increase is made possible by the new factory plans which contemplate utilization of 47 acres. The first unit of the new plant, 400 by 600 ft. and four stories high, already is well under way, and additional units will be constructed as rapidly as human ingenuity will permit. The company placed on the market Jan. 1 a new five-passenger light Six, distinctly the company's own design as regards manufacture, engine, chassis, etc.

A building plan involving an expenditure of close to $10,000,000 and which will require about five years for completion attests the confidence of Dort Motor Car Co. officials in the future of the industry. During the fiscal year ending Oct. 31, 18,649 Dort cars were produced and the production for the calendar year was 21,000. The schedule for the fiscal year 1920 is fixed at 30,000, a mark officials say will be easy of attainment by reason of the additions and improvements that will facilitate quantity production. The present model of the Dort will be continued, the only change that has been made being the substitution of a separate brake lever for the combination clutch and brake and the placing of the gasoline tank in the rear of the car.

Extending factory facilities gradually to meet the increased production schedule, the Hupp Motor Car Corp. has outlined a program for this year that calls for 24,000 cars. Despite the lack of materials and difficulties encountered in shifting from a war to peace basis, the company increased its production 50 per cent last year, turning out 18,000 cars, though like most of the other companies there was a roster of from 6,000 to 8,000 names of purchasers awaiting delivery of cars at all times. Hupp plans include a building program to extend over a period of approximately four years in order to keep pace with the normal business that officials can foresee. The company will stick to the present model with such minor changes and improvements from time to time as will maintain their product at its present high standard.

Scripps Schedules 20,000

Scripps-Booth Corp., operating as a unit of General Motors, built 8273 cars during 1919, but has scheduled an output of 20,000 during this year. Scripps-Booth plans possibly may be interfered with by reason of their inability to get into the Saxon plant Jan. 1 as was contemplated. The new Saxon factory purchased for Scripps-Booth, containing 360,000 sq. ft. of floor space, now is being used by the Government to store airplane material and latest reports are to the effect that it may be months before it will be turned over to the new owners. The company is far behind in production and officials insist from the present outlook it will be some years before the saturation point will begin to loom. Scripps-Booth on Jan. 1 put a new line of six-cylinder cars on the market in four models showing many improvements over the former job.

Saxon production, which for various reasons was curtailed, reached a total of 3,426 cars during 1919, but the goal has been set at 10,000 in the current year. The company is without debt and has a working capital of upwards of $2,500,000.

With the foundation laid for a new service building and 12 acres added to the original 12-acre site, the Liberty Motor Car Co. enters on 1920 production with full confidence in the increasing demand for automobiles and assurance that it can complete its schedule of 15,000 cars during the year. The output of the company in 1919 was approximately 10,900 cars. Liberty officials have devoted considerable effort to their all season type of cars, the sedan creating particular interest.

Grant Plans Triple Output

Grant Motor Car Corp., hampered by the change from war work, produced only about 4,000 cars up to Sept. 1, when the company brought out a new model upon which it got into production Nov. 15, the total output for the year reaching approximately 5,000. The production estimates for 1920 call for 15,000 cars, which schedule has been provided for in additional buildings and plant expansion.

King Motor Car Co. officials see nothing in the future but constantly increasing demands, and have completed plant expansions and improvements that will permit the trebling of the 1919 output in the present year. The company was organized in 1911 with a capitalization of $200,000 to manufacture a four-cylinder car to sell at $1,575. It produced close to 1,000 cars the first year and now has 13,000 in operation. The 1919 output was close to 3,500 cars. The company now has a capitalization of $700,000 and is producing four models.

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Service Men Hold Show Convention

New York and Newark Associations Discuss Problems With Factory Men

NEW YORK, Jan. 12—The Service Convention held last Tuesday afternoon at the Automobile Club of America marked the advent of the service men in showtime activities. The convention, which lasted all the afternoon, was promoted by the New York and Newark Automotive Service Associations and attracted some two hundred local and factory service executives. A banquet in the grill followed and the men then went over to the show in a body.

The proceedings were opened by Alfred Reeves, general manager of the National Automobile Chamber of Commerce, who told the men that the service branch of the automotive business was an extremely important one and predicted the increase in importance of the subject as manufacturers and dealers woke up to the fact that the car or truck which is well sold is well serviced. Reeves stated that the term "Free Service" was almost a thing of the past and that the owner was beginning to realize that he never gets anything for nothing that is worth anything.

A number of factory service managers were among those present, this being the first time in history that factory and local service men have been brought together in one meeting.

In a paper entitled "Benefits of a Service Association," J. Howard Pile, secretary and general manager of the Automotive Service Association of New York, went into the history of the formation of the present organizations and told what they expected to accomplish. Among the advantages outlined were personal contact, dissemination of service information, trips through various service stations, employment bureaus, combating radical tendencies among the workers, perfection of service methods, and propaganda among independent garages in the matter of correct adjustments and repair operations.

Useful as Army Reserve

Major R. A. Osmun, who is very close to the head of the Motor Transport Corps, told how the automotive industry could assist the Motor Transport Corps in organizing a personnel of officers and men who would be experts in their line so that the men in this branch of the service could be raised from their peace basis to nearly 80,000 men almost overnight. Many difficulties had to be overcome in the late war on account of the great difficulties in getting the right men in the right jobs. The army is at the present time seeking to recruit a reserve force, train it and have it ready for immediate call in case of necessity. This force will be trained by the army and will then be available for the industrial end of the automotive business.

Al Rawson, president of the Automotive Service Association of Newark, chose as his subject the possibility of selling service just the same as any other commodity is sold, and the same things that will sell articles of merchandise will sell service. The selling must be courteous, and particular emphasis was laid on this point. In order to stay sold the service must be good and well done. Any service that has a lot of comebacks is not good service and trouble will be encountered in selling it.

Tells of Technical Benefit

Prof. Ethelbert Favary, head of the automotive laboratories of Cooper Union, told of the benefits of technical knowledge to the practical man. He said that technical knowledge was the ability to read and take advantage of the experience of others. The simplest form of technical knowledge is a road sign. Somebody has been along that road before and knows where it goes and has put up a sign so that anybody that can read the sign can tell where the road goes without going over it to find out. This is the most elemental form of technical knowledge. Going higher up, this knowledge is the ability to find out about certain things in books and charts, to interpret formulæ, which are simplified symbols representing the discoveries and experience of others.

Ralph C. Rognon, president of the Automotive Service Association of New York, read a paper on the classification and development of service and service craftsmen. The leading thought in the paper was that the workers should be trained and taught to do things along lines that have been found by experience to be the most efficient. There has been too much made of the practice of hiring "skilled mechanics" and letting them work their own jobs out, with the result that where there are a hundred men in a shop there are a hundred different ways to do things. Rognon's plea was for more and better information for the managers of service stations, so that they could more intelligently train their men.

Dr. Walter L. Hervey, a member of the board of examiners of the New York public schools, spoke on education and told of the numbers of ways that it could be applied.

During the intermission and after the session of the convention there was a demonstration and exhibit of a large number of service station tools and devices which were furnished by manufacturers and distributers. In the evening a banquet was served in the grill room of the club and the diners were provided with a program of musical events, after which the managers went to the automobile show in a body.

BOSTON AGENT NAMED

NEW YORK, Jan. 10—The Roller-Smith Co., manufacturer of electrical instruments, has appointed Walter W. Gaskill, 141 Milk Street, Boston, agent for Boston and other parts of the New England territory. Gaskill replaces the P. I. Perkins Co.

U. S. Rubber Co. to Double Detroit Plant

DETROIT, Jan. 9—Plans for doubling the production of the Morgan & Wright plant, its Detroit subsidiary, have been completed by the United States Rubber Co. New buildings to cost in excess of $1,000,000 now are under way here and details of comprehensive expansion plans are to be made public shortly. The plant vacated by the Columbia Motors Co., Jan. 1, is to be wrecked and a new Morgan & Wright building constructed on the site.

Plan 1920 Production

(*Continued from page* 283)

Maibohm Motors Co. produced 1,050 cars in 1919, the output having been curtailed by fire which destroyed the plant at Racine, Wis., and interrupted production for several months. The company operated on a small scale in temporary quarters at Sandusky until near the end of the year when the new factory was completed. The 1920 schedule calls for 7,500 cars, production of which is assured by factory plans formulated, but even that output, company officials say, will not put them nearly even with the demand. The company has a 25-acre site and its new factory building, 120 by 673 ft., includes its own body plant. Additional loading platforms, dry kilns and 1,000 ft. of siding also will be constructed to care for the increasing demand. The present plant is equipped to permit an output of 50 cars a day.

E. A. Nelson Motor Car Co., which produced 600 cars in 1919, has set 4,000 as the output in 1920, and to assure success of the program officials now are formulating plans for immediate factory expansion.

Barley Motor Car Co., manufacturers of Roamer cars, will build 4,000 during the present year, the production for 1919 having been kept down to 1,600 by various interruptions and lack of facilities. Improvements now in progress at the plant and additions contemplated give evidence of the confidence of officials and assurance of fulfillment of the proposed program.

The W. A. Paterson Co. will more than double the 1919 output, according to the 1920 schedule. The company built 1,400 cars last year and has set 3,000 as the peak this year. The output includes four passenger models ranging in price from $1,695 to $2,600.

In the truck field the feeling of optimism is even more deeply implanted, if possible, than among passenger car manufacturers. The production schedules for 1920 reveal plans for extraordinary increase, in one or two cases contemplating the quadrupling of the 1919 output. The American Commercial Car Co. of Detroit, which produced but 200 Wolverine trucks in 1919, has scheduled a minimum of 1,000 in 1920, though officials express the opinion that the actual production will greatly exceed that figure.

J. H. Fertig Heads Trailer Mfrs. Ass'n

Annual Meeting Considers Progress of the Industry and Makes Plans

NEW YORK, Jan. 12—At the first annual meeting of the Trailer Manufacturers Association of America, held last Thursday at the new headquarters in Grand Central Palace, the members elected J. H. Fertig president, to succeed W. E. Ferris, and C. H. Martin to succeed C. A. Geiger. H. C. Fruehauf and J. C. Endebrock were re-elected first vice-president and secretary-treasurer, respectively.

J. H. Fertig and Ike S. Byrum were elected as new members of the executive committee and W. E. Ferris, J. C. Endebrock, H. C. Fruehauf, W. R. Bonds, and C. H. Martin were re-elected on the committee.

Addresses on short-haul and terminal transportation and on patent matters were delivered by C. W. Reid of the Federal Highway Council, Washington, and R. A. Brannigan of the National Automobile Chamber of Commerce, New York. A paper on advertising by H. Colin Campbell of the Portland Cement Association was delivered by a representative of the New York office of the association.

The trailer association voted to apply for membership in the Chamber of Commerce of the U. S. A. and in the Federal Highway Council.

The desirability of standardizing the load rating of semi-trailers and pole trailers was agreed upon and the general manager was instructed to secure the views of all members as to the best method.

It was voted to be the sense of the meeting that it was desirable to adopt a suitable slogan and emblem to be used by the association and individual trailer manufacturers in their advertising, on their stationery, in their catalogs and on their products. Suggestions for a slogan and designs for an emblem are to be offered for approval at the May meeting.

Work of the past year was reviewed and it was decided to continue activities in 1920 along the same lines and on the same basis.

The May meeting will be held in Detroit and the September meeting probably in Cincinnati.

Trailer companies were represented at the meeting as follows:

Arcadian Trailer Corp., Newark, N. Y., by J. H. Fertig; Detroit Trailer Co., Detroit, by W. R. Bonds and Lewis B. Moore; Fruehauf Trailer Co., Detroit, by H. C. Fruehauf and J. D. Rosenbaum; William G. Hesse & Son Mfg. Co.. Leavenworth, Kansas, by H. W. Perry; Highway Trailer Co., Edgerton, Wis., by E. L. Moorman and Frank M. Lee; King Trailer Co., Ann Arbor, Mich., by H. F. Wardwell; F. P. Lyons Iron Works, Manchester, N. H., by J. A. Methot; Northway Trailercar Co., E. Rochester, N. Y., by H. B. Wyeth; Ohio Trailer Co., Cleveland, by W. E. Ferris; Shadbolt Mfg. Co., Brooklyn, N. Y., by W. O. Shadbolt; Trainmobile Co., Cincinnati, by J. C. Endebrock and Henry M. Wood; Warner Mfg. Co., Beloit, Wis., by Max Herrmann and M. A. Potter.

A. L. McMeans Out as Dodge Official

DETROIT, Jan. 9—Resignation of A. L. McMeans, treasurer of Dodge Brothers, created some surprise in Detroit when it became public after he had left the Dodge organization Jan. 1. McMeans would make no statement regarding his resignation or his future plans. A report that he would become associated with the Wills-Lee forces was denied by John R. Lee.

McMeans long had been prominent in the councils of Dodge Brothers and he is said to have had the deciding vote in the matter of the sale of Dodge Brothers' stock in the Ford Motor Co. Officials of Dodge Brothers declined to make any statement regarding the resignation. His successor has not been selected.

Buckeye Castings Co. Pays 41% Dividend

CLEVELAND, Jan. 10—Directors of the Buckeye Steel Castings Co., Columbus, Ohio, have just declared an extra dividend of 18 per cent, making 41 per cent for the year as compared with 26 per cent in 1918. The company is capitalized at $1.500,000.

TRACTOR COURSE TO OPEN

DETROIT, Jan. 9—Truck and tractor schools to be conducted at the Michigan Agricultural College in February and March are expected to attract record attendances. The schools will be conducted under the auspices of the farm mechanic department and a dozen different trucks and tractors will be used during the course. One of the requirements for a diploma will be familiarity with all the leading models of trucks and tractors. Each school will run four weeks, the first beginning Feb. 2 and the second March 1. Ignition valve and spark timing, carbureter adjustments, brake and fuel consumption tests, lighting and engine trouble work will be among the subjects emphasized. Actual adjustments and repairs on trucks and tractors in the laboratories will play a prominent part.

SANTA ROSA SHOW SET

SANTA ROSA, CAL., Jan. 9—The annual automobile show of the Sonoma County Automobile Trade Association will be held in Santa Rosa, March 6 to 13, under the management of Luther L. Putnam.

Announcement is also made of a meeting of the northern division of the California State Automobile Trade Association, at Santa Rosa, Feb. 19 and 20.

Oliver Rim Factory Nearing Completion

Company Plans Production of 1,000 Daily in New Atlanta Plant

ATLANTA, GA., Jan. 10—Work has again started on the new plant of the Oliver Rim Co. here, following a delay of several weeks occasioned by labor troubles, and it is expected that the plant will be completed and ready for operation within the next two months. All of the machinery is already in Atlanta and will be installed in the course of a month.

Nearly a thousand men and women of Georgia and North Carolina, about a third of whom are practical automobile men engaged in some branch of the business, have become stockholders in this new company. As soon as the plant is finished a meeting of these stockholders will be held and a new board of directors and officers elected.

The company has adopted the trademark, "Oliver Double-Jointed Rim," for its product, which is a two-piece, quick-change rim, adaptable for use on any automobile using a demountable rim. An extensive, national advertising campaign has been mapped out and will be put under way about Feb. 1. A big sales force is also being organized to take the road as soon as the plant is ready to turn out the rims. They will be placed on sale in all equipment houses.

Though the plant is only now in the process of construction and will not be in operation for about two months, so many advance orders have been received for the company's product that plans are already under way to increase the capacity from 500 to 1000 rims daily, and shortly to even double that capacity.

Garford Truck Co. Doubles Capital

NEW YORK, Jan. 9—Announcement was made to-day by President E. A. Williams, Jr., of the Garford Motor Truck Co. of Lima, Ohio, of an increase in the capital stock of the company from $5,000,000 to $10,000,000 to provide for plant expansion. With new buildings and equipment planned the output of the company will be doubled.

A new factory, 40 x 100 ft., is to be used for the progressive assembly of trucks. Other buildings will be added upon the recently purchased ground adjoining the factory. Under the new production schedule it is hoped to meet both domestic and foreign business pressure.

OPEN DISPLAY ROOMS

The Moody Motor Sales Co.. a new Milwaukee corporation, which has been appointed State distributer of the Anderson Six, has opened display rooms and offices at 128-130 Mason street, which also will be the retail salesrooms for Milwaukee city and country. The members of the concern are Joseph, Chester and Charles R. Moody.

Test New Silent Airplane Engine

150-200 H.P. Engine Being Built with Paragon Silent Cycle System

LONDON, Dec. 23 (Special Correspondence)—In 1912 Capt. W. P. Durtnall and Commander Bowles brought out the Paragon silent cycle for internal combustion engines and on the eve of the war had made arrangements with an English company of engine builders to adopt it for large sets of 1000 hp. This system is being developed and a 150-200 hp. engine is being built to demonstrate it. Meanwhile tests have been made on a converted gas engine with, it is reported, very satisfactory results.

The claims refer more especially to aircraft engines, and cover the two features of silencing the exhaust and enabling crude oil to be used by aircraft engines with a full power output up to an altitude of 20,000 ft. At present the exhaust pressure of the gases is very high in ordinary airplane engines, with the result that the noise produced is so considerable that the pilot cannot hear anything else.

Under the system used in the Bowles and Durtnall engine, the exhaust gases leave the engine at ½-lb. pressure per sq. in., which, it is claimed, results in silent operation, and in so great a reduction of the temperature that it is impossible to get a flame from the exhaust in any circumstance. ENGLISHMAN.

Studebaker Corp. Banquets at Astor

NEW YORK, Jan. 12—After an absence of two years on account of war conditions, the annual banquet of the Studebaker Corp. during show week in New York reappeared at the Hotel Astor on the evening of Jan. 8. President A. R. Erskine presided as toastmaster, while nearly 250 Studebaker dealers and officials were guests of the evening.

General Sales Manager H. A. Biggs emphasized the necessity of building good will at the present time while demand so far exceeds supply. The time is coming when competition will again be keen, he said, and the firm which is ready to meet that competition with an abundance of stored-up goodwill is the firm which will be successful in the long run.

The Studebaker industrial co-operation plan, which has recently been considerably broadened in its scope, was explained by Dr. A. C. Lippincott, who is now in charge of its administration. Dr. Lippincott emphasized that the plan was based upon a sound business basis, which enabled the employee to benefit by it to the utmost and yet not feel that he is being "welfared." Most so-called welfare plans, Dr. Lippincott said, are executed, with whatever benefits they confer, at the expense of the workers' self-respect. And no material benefit, he declared, is worth that sacrifice.

Erskine announced that the Studebaker corporation did $80,000,000 worth of business in 1919 and expected to increase to $130,000,000 in 1920. Production plans, he announced, are for 45,000 to 50,000 cars in 1920.

Mass. Co. to Make Rauch & Lang Cars

NEW YORK, Jan. 10—Announcement was made in New York to-day of the purchase of Rauch & Lang, Inc., of Cleveland, by Ray S. Deering, president of Stevens-Duryea, and the formation of a company by him to manufacture Rauch & Lang electric cars in a factory to be erected in Chicopee, Mass., adjacent to the Stevens-Duryea plant.

The company will locate on an 18-acre tract just purchased on which it is proposed to erect a factory which will permit of greatly increased production over the present figures. Associated with Deering in the organization of the new company is George C. Gill, president of the Holyoke National Bank. The personnel of the company is to be announced.

The Baker Raulang Co. of Cleveland, from whom the purchase was made, will continue the manufacture of car bodies and factory trailers. A contract has been closed with the Baker Raulang Co. for the manufacture of all closed car bodies for the new Stevens-Duryea product.

CHALLONER HEAD DIES

OSHKOSH, WIS., Jan. 12—Mrs. Lillian Everhart, president and general manager of the Challoner Co., Oshkosh, Wis., manufacturer of Giant Grip non-skid devices for motor truck wheels, died suddenly at Milwaukee while visiting her daughter. Upon the death of her husband, C. W. George Everhart, in 1911, Mrs. Everhart assumed the general management of the company and was regarded as one of the ablest women executives in Wisconsin industry.

SELL ARMY VEHICLES

WASHINGTON, Jan. 9—The Director of Sales of the War Department condemned and cleared 8774 motor vehicles for sale up to Jan. 3, of which number 3626 have been sold. Included in those cleared for sale are 547 Fords, 731 miscellaneous passenger cars, 118 ambulances, 936 light delivery trucks, 1268 2-ton trucks, 382 Nash trucks, 1732 miscellaneous 3-5-ton trucks, 37 trailers, 1891 motorcycles, 1006 motorcycles with sidecars and 126 bicycles, all of which have been declared unserviceable by the Director of Sales.

GETS WISCONSIN LICENSE

The Mason Tire & Rubber Co., a New York corporation, which is now conducting a factory branch at 450 Jackson Street, Milwaukee, for Wisconsin and Upper Michigan territory, has been granted a Wisconsin license to do business as a foreign corporation.

Report $3,000,000 Bill for Air Mail Service

WASHINGTON, Jan. 9—The post office appropriation bill of $3,000,000 for air mail service and including $8,000,000 for extension of post office motor express routes to every Congressional district, was reported to the house by the committee on post offices and post roads. The bill would insure the continuation of the experimental motor truck express routes conducted in the District of Columbia and surrounding states.

Four new air mail routes to link the important cities of the country from coast to coast will be established if Congress passes the bill, according to a statement by Postmaster General Burleson to-day. The new routes include: Chicago to San Francisco, Pittsburgh to Kansas City via Cincinnati, Indianapolis and St. Louis, New York to Atlanta via Washington, and Minneapolis and St. Paul via Chicago.

Another route now being investigated is by hydroplane down the Mississippi river from St. Louis to New Orleans via Cairo, Memphis and Vicksburg.

Mr. Burleson estimates that 382,000,000 letters will be expedited by the extension.

General Motors Now Largest Corporation

NEW YORK, Jan. 10—Stockholders of the General Motors Corp., at a meeting in Wilmington, Del., Jan. 6, approved the new capitalization plan for the issuance of non par stock and its exchange, 10 for 1, for the existing issue on May 3, 1920.

The new plan authorizes 6,100,000 shares of capital stock, preferred and debenture, at $500 a share, and $50,000,000 common of nominal par value.

This makes the General Motors a $1,000,000,000 corporation—the largest industrial corporation in the world.

The new capitalization will consist of the following amounts: 200,000 shares preferred stock, par $100; 900,000 shares debenture stock, par $100; 5,000,000 shares 7 per cent debenture stock, par $1,000; 50 000,000 shares common stock without par value.

PLAN KENTUCKY ROADS

LOUISVILLE, KY., Jan. 9—Legislation providing for a system of highways throughout Kentucky which will give every county in the state at least one main artery of travel was discussed at a meeting of highway experts last Sunday.

A bill has been drawn which reduces the state system of roads from 6500 to 3000 miles and provides that highways built with state and Federal aid be maintained by the state.

TRUCK DEALERS ORGANIZE

CINCINNATI, Jan. 12—The Truck Dealers' Association of Cincinnati has been organized here under the auspices of the Firestone Ship by Truck Bureau.

S.A.E. Adopts Many Reports at Session

Standards Committee Recommendations Source of Greatest Progress

NEW YORK CITY, Jan. 9—The three-day winter session of the Society of Automotive Engineers closed here last night with the annual banquet attended by 1500 members and guests. The session was characterized by important professional papers and the reports of fifteen divisions of the Standards Committee. Although discussion was somewhat short, due to a rather full program, the meeting covered a wide field. As practically all the reports of the divisions of the Standards Committee were accepted, the session was the occasion for a long stride in this respect.

Col. J. G. Vincent was elected to succeed H. M. Manley as president of the society. Colonel Vincent is vice-president of engineering of the Packard Motor Car Co., and distinguished himself during the war by his important work in connection with the design of the Liberty airplane engine. The slate of officers who are to serve with Colonel Vincent is in accordance with the complete list published in AUTOMOTIVE INDUSTRIES, Nov. 20, page 1042. J. G. Utz of Standard Parts is first vice-president.

The sessions this year were divided, one being devoted to general society business. Fuel and research was the topic of one session. Engine design was represented in papers on Tendencies in Design by L. H. Pomeroy and Frank Trego; Aluminum Pistons by E. G. Gunn, and an Automotive Steam System by L. L. Scott. Body and chassis design were covered by papers on Automobile Body Design by William Brewster, Springs and Spring Suspension by E. Favary and the Measurement of Vehicle Vibrations by Benjamin Liebowitz.

Discuss Fuel Situation

The fuel situation was discussed from both the designers and refiners' standpoints, the papers being Adapting Engines to the Use of Available Fuels by J. G. Vincent; Dilution of Engine Lubricants by G. A. Kramer and a symposium on hydrocarbon fuels by Messrs. Honaman, McKenzie, S. W. Sparrow, C. F. Kettering, H. L. Horning and H. C. Dickinson. Dr. J. E. Pogue spoke on Composite Fuels, H. C. Gibson on Bettering the Efficiency of Present Engines, Prof. O. C. Berry on Mixture Requirements of Automobile Engines and Major Hallett on Supercharging.

The social features of the meeting proved unusually successful. The question of the next summer meeting has not been discussed, but it is understood that a considerable number of members favor a return to Ottawa Beach, the scene of the very successful convention of 1919.

BRIDGEPORT SHOW SET

BRIDGEPORT, CONN., Jan. 12—Bridgeport's annual automobile show will be held in the State Armory and annex, under the auspices of the Connecticut State Guard, 4th Infantry. Dates have been selected as Feb. 2 to 7 inclusive, and the show will be under the management of B. B. Steiber.

Report National to Enter Truck Field

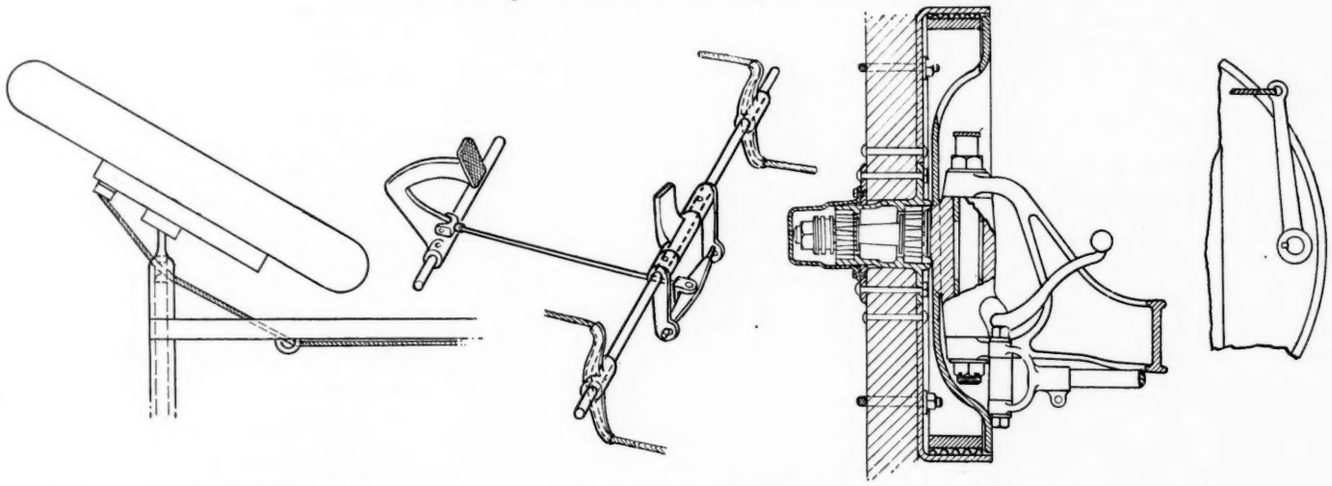
Negotiations Under Way for Purchase of Four Lakes Plant in Madison

MILWAUKEE, WIS., Jan. 12—A report from Madison, Wis., says that negotiations are under way between the National Motor Car & Vehicle Corp., Indianapolis, and George A. Steinle, Madison, for the purchase of the plant of the Four Lakes Ordnance Co., in that city, and will be used for the production of motor trucks. The Four Lakes plant was built and equipped by Mr. Steinle during the war period to manufacture naval guns for the Government. It is regarded as one of the model machine shops of the world. Mr. Steinle is owner of the Steinle Turret Machine Co. of Madison. The plant is 250 x 300 ft., and is to be enlarged by a three-story addition, 150 x 300 ft., by the new owner.

PASS TARIFF DECREE

WASHINGTON, Jan. 10—The usual authorization for an executive decree providing for the continuance of preferential tariff treatment for certain American goods during the year 1920 has been adopted by the Brazilian Congress, according to cablegram received Jan. 2 by the Bureau of Foreign and Domestic Commerce. The budget law itself does not specify the articles to which the reductions are to apply, these being designated in the separate executive decree, which has not yet been issued. Little change is anticipated in existing rates.

Laundry Front Wheel Brake



New Redford, Mass., Dec. 23—Joseph Landry has organized the Landry Mfg. Co, to manufacture a front wheel brake of his invention. The brake drums are secured to the wheels in the usual way, and the brakes themselves are carried by sheet steel disks, which are autogenously welded to the steering knuckles. Each disk supports the bearing for the shaft carrying the expander cam. The projecting end of the shaft, outside the disk, carries a long lever arm to the free end of which is connected a bronze flexible cable. This latter passes through an eye in a bracket located in the prolongation of the steering knuckle pin axis, then through another guide and then to a brake shaft extending across the frame of the car about midway of its length. Mr. Landry contemplates using brakes on all four wheels, and to operate them by a single pedal. The braking action will be equalized as between the front and the rear wheel brakes, and also between the two brakes of each pair. The sketch herewith shows the general construction of the brake.

Handley-Knight Car Promised by Summer

Kalamazoo Selected as Manufacturing Site—New Corporation Headed by J. I. Handley

NEW YORK, Jan. 14—Organization of the Handley-Knight Co., a $1,000,000 corporation, to manufacture a four-cylinder Knight car, was announced here to-day by J. I. Handley of Kalamazoo.

Plans for a plant in Kalamazoo, where the company has purchased 40 acres, have been made. It is expected that this first unit will accommodate a production of 30 cars a day. For convenience in handling the preparatory work of getting under way, temporary offices for the engineering and purchasing departments will be located in Detroit.

Only a portion of the authorized issue of stock has been sold. This was disposed of in less than 20 min. and was heavily oversubscribed

The board of directors includes: W. E. Upjohn, Kalamazoo; S. E. Campbell, president of the First National Bank of Kalamazoo; Henry Den Bleyker, Kalamazoo; H. B. Parker, Michigan City, and H. C. Howard, counsel, also of Kalamazoo; Walter Stewart, Toledo, former treasurer of the Willys-Overland Co.; Martin V. Kelley, president of the Martin V. Kelley Advertising Agency, and J. I. Handley, who now severs his connection with the Willys-Overland Co.

Officers of the company are: J. I. Handley, president; W. E. Upjohn and C. S. Campbell, vice-presidents, and W. O. Otis, secretary-treasurer.

The company has arranged for its license for Knight motors from the Knight-American Patents Co. Arrangements have been made with the Willys-Overland Co. for the manufacture at its Knight motor plant at Elyria, Ohio, of the four-cylinder Knight motors. One chassis will be built for a variety of body types.

Quantity production is expected by midsummer.

WESTINGHOUSE CHANGES

NEW YORK, Jan. 8—The Westinghouse Air Brake Co., Wilmerding, Pa., has announced several changes in its organization. J. R. Ellicott, manager of the eastern district, has retired after long service. He will, however, act with the officers of the company in a consulting capacity. Ellicott will be succeeded by C. R. Ellicott. C. H. Beck, heretofore special representative, Safety Car Device Co., succeeds C. R. Ellicott as assistant eastern manager, with headquarters in New York.

With the promotion of E. A. Craig to export manager, headquarters in Pittsburgh, Robert Burgess, representative at Atlanta, becomes southeastern manager, with headquarters in Washington. A. K. Hohmyer, Chicago, is promoted to assistant western manager. Other promotions announced are: W. G. Kaylor, export department, New York; F. H. Parke, general engineer southeastern district, Pittsburgh; T. W. Newburn, district manager, southeastern district, Washington; J. C. McCune, assistant to district engineer, eastern district, New York; and J. H. Woods, engineer, export department, Pittsburgh.

British Molders Agree to Terms

LONDON, Jan. 3 (*Special Correspondence*)—Work will be resumed in British foundries Jan. 10, after a fifteen-week lay-off, if an agreement reached recently between employers and molders is carried out. The proposed settlement grants an increase of 5 shillings weekly, but it cannot be officially accepted until after a vote by members of the unions affected.

There are 50,000 actual strikers, but hundreds of thousands of men have been idle and millions lost in trade, through the shutting off of all castings due to the strike. The motor industry has been affected especially, to the resulting benefit of American exporters.

Ford Workman Sues for Share in Deal

DETROIT, Jan. 9.—Warren W. Ayers, a toolmaker in the Ford Motor Co. plant, in a suit against an attorney for $100,000, alleges he negotiated the deal whereby Dodge Brothers sold their Ford interests for $26,000,000. The defendant, who held an option on the Dodge stock, answering the suit admits negotiations with Ayers but bases refusal to pay the promised $100,000 commission on the ground that Ayers represented himself as acting for Ford employees in the deal rather than for Henry and Edsel Ford.

A. L. McMeans, secretary of Dodge Brothers, who resigned recently and who is credited with having engineered the Ford-Dodge deal, figures in the case to the extent of having encouraged Ayers to pursue his plan to form a co-operative employees syndicate and buy the Dodge stock, according to Ayers' petition. Ayers' petition states he had the advice and encouragement of Henry and Edsel Ford in the negotiations that resulted in the stock transfer.

CASE TO EXTEND PLANT

RACINE, WIS., Jan. 12—The J. I. Case Plow Works of Racine, Wis., a recent consolidation of the old J. I. Case Plow Works and the Wallis Tractor Co., has purchased four acres adjacent to its manufacturing group for important extensions to its plant. The ground was acquired from the Mitchell Motors Co. As soon as possible work will begin on new malleable and gray iron foundries, additional machine shops, assembling rooms, etc. An expenditure of $500,000 is contemplated during the first half of 1920.

Form Holding Corp. of Lexington Group

United States Automotive Corp. to Be Head of Connersville Industries

NEW YORK, Jan. 10—Formation of the United States Automotive Corp. to operate as a holding company for the Lexington Motor Co., and other companies affiliated in production of the Lexington car, was announced in New York by Frank B. Ansted, president of the Lexington company, who is attending the national automobile show.

The new corporation will have a capital of $10,000,000 in preferred stock, and 200,000 shares of no par value common stock. It is to act as a holding company for the following subsidiaries:

Lexington Motor Co., Ansted Engineering Co., Connersville Foundry Corp., and the Teetor-Hartley Motor Corp., all of which are in Connersville, Ind., except the last named.

Officers of the new corporation are Frank B. Ansted, president; George W. Ansted and Frederic I. Barrows, vice-presidents; James M. Heron, treasurer, and LeRoy A. Hanson, secretary. Directors, in addition to the officers, are William B. Ansted, Charles C. Hull, John C. Moore, Arthur A. Ansted, Emery Huston and Elmer J. Hess.

SCHOOLS SEEK ARMY TOOLS

WASHINGTON, Jan. 9—Requests from schools throughout the country for machine tools from the War Department have been received in quantities as a result of the Caldwell bill, authorizing the sale of machine tools for educational purposes at 15 per cent of the original cost to the Government. Ohio and Michigan schools are leading among the States in their requests, this perhaps being due to the large number of factories in these two States where machine tools and a knowledge of them are important.

MAKES NEW CARBURETER

BEAVER DAM, WIS., Jan. 12—C. W. Kings of Chicago, an engineer and designer, has opened a plant at Beaver Dam, Wis., for the manufacture of a new type of carbureter using kerosene and the heavier distillates of petroleum as fuel. The plant will be operated as the Kings Carbureter Works and will specialize in a device especially adapted for tractor use. The shop occupies the former Weyenberg shoe factory.

NEW NASH 4 UNDER WAY

MILWAUKEE, WIS., Jan. 12—The new Milwaukee works of the Nash Motors Co. of Kenosha, Wis., in which the production of a new Nash 4-cylinder passenger car will be undertaken, are in partial operation, construction work having been done in record time. Already contracts have been awarded for an addition to the first building, a machine shop, 200 x 600 ft. Ground was broken Jan. 10. It is hoped to have the works in full operation by April 1.

Financial Notes

Maxwell Motor Co. profits for the fiscal year ended July 31 last were the poorest since 1915. The balance for the first preferred after taxes, depreciation and contingencies was 11.64 per cent, as compared with 17.11 per cent a year ago.

Bethlehem Motors Corp. reports net earnings of $140,681 after charges and Federal taxes for the five months ended Nov. 30, 1919. This is at the rate of $337,500 a year, or about $2.50 a share on the 130,000 shares of capital stock outstanding.

Locomobile Co., in a balance sheet recently issued, shows total current assets of $5,495,585 and current liabilities of $1,366,789, a working capital of over $4,000,000. Officials estimate the year's net profit at $1,300,000, and may reach $1,500,000 after taxes, interest and preferred dividends.

Line Drive Tractor Co. creditors will be paid a first dividend of 3 per cent. The company was a South Dakota corporation which manufactured tractors in Milwaukee for a time.

Falls Motor Corp. has increased its capital stock from $2,000,000 to $4,000,000 to accommodate the growth in its business and cover additions and extensions in 1919 and 1920.

Griffin Wheel Co. announces net profits after payment of Federal taxes of over $2,000,000 for 1919. To meet preferred dividends $360,000 is required.

Mullins Body Corp. will pay a quarterly dividend of $1 on common stock Feb. 1 to stockholders of record Jan. 15. This increases the dividend rate from $3 to $4 a year.

Rubay Co. has declared an initial dividend of 1¾ per cent on the preferred stock, payable Jan. 1 to stockholders of record Dec. 24. It is reported the company has $4,000,000 in unfilled orders for automobile bodies.

McGraw Tire & Rubber Co. directors, at a meeting Dec. 20, authorized the payment of a quarterly dividend of 1¾ per cent upon the issued and outstanding preferred capital stock, on January 1, to stockholders of record on Dec. 20.

Foreign Distributers Attend Packard Show

NEW YORK, Jan. 12—The Packard export exhibition, at the Packard Motor Car Co. foreign distribution headquarters, 1861 Broadway, drew large attendances during show week.

Most of the Packard "twin sixes" on display were cars built especially for the export trade, and many Packard distributers from abroad were present. Among the dealers who came to America especially for this show were Luiz D'Orey and José D'Orey, distributers in Brazil and Portugal respectively. G. Aspelin of Norway and John M. Larson, who controls Packard destinies in Denmark and Sweden, also were present. Other foreign representatives who visited the exhibition were P. J. Janssen of the Dutch East Indies, C. B. Foley of Delhi, India; E. E. Bodge, from Honolulu; John Panagoulopoulos of Greece, and Enea Bossi of Italy. One of the early visitors was Thomas Thrige, the inventor, who is known as the Thomas A. Edison of Denmark.

The exhibition was such a pronounced success that plans are being made to make it an annual event.

Tire Makers Unite Divisions in R. A. A.

NEW YORK, Jan. 10.—The Solid Tire and Pneumatic Tire Manufacturers' Divisions of the Rubber Association of America were merged into the Tire Manufacturers' Division at the annual meeting held Jan. 6. John Kearns, of the Lee Tire & Rubber Co., was elected chairman of the new division, and Seneca G. Lewis, of the Pennsylvania Rubber Co., vice-chairman.

The proposition of adopting a uniform practise of tire mileage adjustment was discussed at the meeting of the division, and considerable progress toward this end was reported. The formal adoption of a uniform scale, however, was left to be worked out at a future meeting.

Representatives on the executive board of the new division are: J. C. Weston, Ajax; F. J. Reynolds, Empire; A. G. Partridge, Firestone; B. H. Breedwell, Fisk; William O'Neil, General; W. O. Rutherford, Goodrich; G. M. Stadelman, Goodyear; W. W. Duncan, Hood; C. R. Cook, Kelly-Springfield; R. T. Griffiths, Miller; W. B. Miller, Norwalk; J. W. Maguire, Portage; Thomas E. Walsh, Swinehart; G. F. Shugart, United States; H. H. Dorr, Victor.

New officers of the Rubber Association are: Homer E. Sawyer, president; Harry T. Dunn, first vice-president; Frank A. Seiberling, second vice-president; A. L. Viles, general-manager and secretary, and William C. Cox, treasurer. Five additional directors chosen are H. E. Sawyer, W. C. Rutherford, John W. Maguire, John S. Broughton and A. H. Brown.

NEW YORK DEALER KILLED

NEW YORK, Jan. 12—Robert Reid, secretary of the Harrolds Motor Co., 233 West Fifty-fourth Street, Pierce-Arrow dealer, was killed yesterday when a new car he was trying out plunged over a 25-ft. embankment in the "Snake Hill" section of St. Nicholas Avenue. Thomas G. May of Newark, N. J., and Samuel Breedon of St. Louis, both Pierce-Arrow dealers, were hurt.

The three men were caught between the wrecked car and a stone wall at the bottom of the cliff. According to May, Reid had swerved to avoid a car stalled in the roadway. Reid's skull was fractured and he died before medical aid reached him.

John F. Dodge, Head of Dodge Bros., Dies

Stricken While Attending New York Show—Brother, Also Ill, Recovering

NEW YORK, Jan. 15—John F. Dodge, president and treasurer of Dodge Brothers, automobile manufacturers of Detroit, died last night at the Ritz-Carlton Hotel here. His brother, Horace E. Dodge, vice-president of the company, seriously ill at the same hotel, is reported recovering. The brothers were stricken with influenza while attending the automobile show, and both developed pneumonia.

John F. Dodge was born in Niles, Mich., 54 years ago. After a public school education he served an apprenticeship in his father's machine shop. In 1886 he moved to Detroit. He was later joined by his brother and they formed the Dodge Brothers Company. Their first automobile was exhibited in 1915. Their plant in Detroit is now one of the largest in the country.

Dodge Brothers had from their entry into the automobile business occupied a unique and enviable position. They have formed the closest of close corporations, the brothers being the whole concern. There have been no other partners and not a dollar of capital but their own was invested in it.

At their first exhibition their car occupied a small obscure position on the second floor of the exhibit. Their first car had been sold only a month previously. The next year they were on the main floor, ranking eighth in volume of business. In 1917 they were in fourth place and since then they have been recognized as being in the foremost rank.

Before starting their own business the brothers had been associated with Henry Ford and for some time thereafter were large stockholders in the Ford enterprise. There was much litigation between the Dodge brothers and Mr. Ford. In November, 1916, they enjoined him from spending more than $50,000,000 of surplus in plant extensions, demanding that it be distributed in dividends. The matter was fought out in the courts and the Dodge brothers were successful. At that time they held 10 per cent of the Ford stock.

Some time thereafter Ford bought out the holdings of the Dodge Brothers in his stock. The fortune of John F. Dodge is placed at upward of $50,000,000, all of which was derived from the manufacture of automobiles.

EXPAND GAGE PLANT

LA CROSSE, WIS., Jan. 12—The National Gage & Equipment Co. of La Crosse, Wis., has completed plans for erecting a one-story brick and steel factory addition, 150 x 250 ft., doubling the capacity of its plant. It makes gages and other instruments for the automotive industries. The present force of 600 will be increased to 1000 by May 1.

Joins Directorates of British Firms

LONDON, Dec. 23 (Special Correspondence)—Among a number of reports concerning changes in the personnel of the British motor industry, and developments concerning the stability of certain companies, it is stated that S. F. Edge is joining the Armstrong-Siddeley directorate and also the directorate of Auto Carriers, Ltd. Both companies showed new post-war "six" models recently at Olympia, and both models were the subject of special reference by Edge after a trial of them.

The Auto Carriers Co. is one of the oldest British companies, but has not been conspicuously prominent, though always associated with good grade products in the smaller categories. The Armstrong-Siddeley Co. was recently floated on its amalgamation with the Armtrong-Whitworth interests, but it is reported that much of the capital was underwritten. It has a well-managed business, but is likely to find a handicap in the 26-acre factory which the war added to the company's modest ¾ acre of before the war.

Maxton R. Davies, vice-president and secretary of the Dunlap, Ward Advertising Co., Cleveland, and former manager of that agency's Detroit office, has returned to Detroit to become a vice-president of Seelye and Brown, Inc. He will serve as counsel on automotive advertising and sales.

E. Hunn, Jr., service manager with the Packard Motor Car Co., has resigned to accept a similar position with the Rapid Addressing Machine Co. of New York.

Harry H. Brown, assistant to L. J. Ollier, vice-president of the Studebaker Corp. prior to the war, has been appointed district sales manager of the Four-Wheel Drive Truck Co., of Clintonville, Wis., with Washington and Oregon as his territory. During the war Brown was motor transportation chief attached to the 82nd Division.

R. C. Place, well known in the truck and tractor field, has been made purchasing agent of the Reynolds Motor Truck Co. of Mt. Clemens, Mich. Announcement of the appointment was made by Vice-President A. A. Lehr.

R. R. Hayward, who resigned recently from the United States Rubber Co. organization, has been appointed district sales manager for the Premier Rubber & Insulation Co. of Dayton, Ohio, and will have his headquarters in Detroit.

Eugene Bemb, who gained nation-wide fame in bringing a Glidden trophy to Detroit, has resigned as service manager for the Hudson Motor Car Co. and Essex Motors, to take up similar duties with his brother, Walter Bemb, of the Bemb-Robinson Co., distributers of Hudson and Essex cars. He has been in the automobile business since 1915 and gained fame as a contest driver.

Men of the Industry

Changes in Personnel and Position

Henry Fournier Dies; Was Pioneer Racer

PARIS, Dec. 20 (Special Correspondence)—Henry Fournier, pioneer motorist and race driver, died here this week, aged 48. Fournier, who first came into prominence as an amateur and later a professional racing cyclist, became connected with the automobile industry in 1895 and brought the first De Dion Bouton gasoline motorcycle to America in 1896. He gave demonstrations with this machine in California, where he sold the machine for $2,000. The purchaser, being afraid to ride it, took the engine out of the frame and mounted it in a boat.

Fournier won the Paris to Bordeaux and the Paris to Berlin races in a Mors car in 1901. The following year he came to America again and established the mile record. In company with a number of newspaper men, among them A. G. Batchelder, he was badly injured on Long Island when his car was struck by an electric train. He recovered and returned to France, where he opened the biggest garage in Paris. Fournier took part in a number of motorboat races with success. In 1907 and 1908 he raced in France, Italy and at Savannah in an Itala car. Aviation attracted him, and in 1909 he secured his pilot's certificate on a Voisin plane.

Of wonderful physique when in his prime, Fournier's health broke about 1913. When he volunteered for the army in 1914 he was refused on physical grounds. He erected a shell factory in the neighborhood of Paris and was in charge of this until the armistice.

MOON RESIGNS IN OHIO

COLUMBUS, OHIO, Jan. 12 — Victor Moon, for two years manager of the Ohio Automobile Trade Association, has tendered his resignation to take effect at an early date. He will engage in a branch of the automotive business. He will be succeeded by E. J. Shover, who has been assistant secretary and special counsel of the Ohio Good Roads Federation.

W. L. Clark, general sales manager of the Samson Tractor Co., Janesville, Wis., division of General Motors, resigned Jan. 1 and is succeeded by C. C. Clay, with Hugh M. Craig as assistant sales manager. Clay formerly was manager of the Atlanta branch of Chevrolet and for some time has been acting as sales manager of the Samson farm truck division at Janesville. Craig directed the sales of the tractor implement department.

Prominent Dealer Pneumonia Victim

NEW YORK, Jan. 12—George E. Blakeslee, Cadillac dealer in Jersey City, and prominent good roads advocate in Jersey, died Saturday in Christ Hospital, Jersey City, of pneumonia.

Blakeslee was for several years president of the Cadillac Dealers Association, president of the New Jersey Auto Trades Association for three years, and until his death a director; a member of the New Jersey State Highway Commission, and in November was elected president of the Boulevard Commission of Hudson county.

He successfully managed the campaign of Governor-elect Edward J. Edwards, who will take office Jan. 20.

Practically unaided Blakeslee was the means of having the Egan Good Roads bill passed by a referendum vote of 90,000 in Jersey three years ago.

In the death of Blakeslee the automobile trade loses a valuable member.

Will F. Hauck, who has been in charge of the state employment bureau for 10 years, has been placed in charge of the employment department of the Columbus branch of the Timken Roller Bearing Co. The company will soon complete a large factory in Columbus which will be placed in operation within two months.

John T. Spicer has been appointed general sales manager of the Thermoid Rubber Co., Trenton, N. J. He was formerly advertising manager of the company.

Harry Harmer, for the past seven years in charge of the national users' business of the White company, has become identified with the Service Motor Truck Co., as Chicago branch manager.

C. E. Albright is no longer connected with the Standard Motor Truck Co., as Pacific Coast sales manager, according to an announcement from the company.

Howard B. Hall, vice-president of the Bethlehem Motors Corp. and director of the export activities of the company, has resigned, effective Feb. 1. He has not announced his plans for the future.

C. H. LeHuquet has resigned as assistant sales manager of the International India Rubber Corp. of South Bend, Ind.

E. Earl Dawson, for the last six years in charge of the Detroit salesrooms of the Chevrolet Motor Co., has been made salesmanager of the company at the factory in Flint, Mich. Dawson engaged in the automobile business soon after leaving the University of Michigan and for a time was connected with the William Small Automobile Co. at Indianapolis.

Franklin W. Loomis, sales manager of the Dallas Power & Lighting Co., has joined the staff of The Society for Electrical Development.

Current News of Factories

Notes of New Plants—Old Ones Enlarged

Forging Interests Are Consolidated

NEW YORK, Jan. 12—Consolidation of the Ingalls-Shepard Forging Co., Harvey, Ill., with the Wyman-Gordon Co., Worcester, Mass., is announced. Plans are under way for materially increased production in both plants, and for specializing to a greater extent than heretofore in the manufacture of crankshafts, camshafts, axles, gears, steering-knuckles, etc.

F. A. Ingalls, president of the Ingalls-Shepard Forging Co., retains a large interest in the business, and will become a vice-president of the Wyman-Gordon Co., in active charge of the Harvey works, which will be known as the Ingalls-Shepard Division of the Wyman-Gordon Co.

The general offices of the company will be in the Worcester plant, which also will be headquarters of George F. Fuller, president, and Harry G. Stoddard, vice-president and general manager.

James D. Sutherland, whose headquarters have been at the Cleveland works, will be located in the Society for Savings Building in Cleveland.

DU PONT CO. ENLARGES

WILMINGTON, DEL., Jan. 9—The du Pont Motors Co., which is placing a new machine on the market, is enlarging its plant here. The company exhibited the first two machines in New York and they are said to have made such a favorable impression that manufacture of others for the market is about to be begun.

STEEL FIRMS COMBINED

DAYTON, OHIO, Jan. 12—The National Steel Products Co. has been incorporated here to take over the combined plants and assets of the National Vacuum Machinery Co. and the Crown Hardware Mfg. Co. The company will specialize in the manufacture of "Ream" universal joints, steel specialties, tools and dies. They will continue also the manufacture of Crown plating machinery and accessories.

The officers of the company include: J. G. Petosky, president; T. M. Hiester, vice-president and general manager, and Joseph G. Lehman, secretary and treasurer.

BADGER BOAT CO. GROWS

RACINE, WIS., Jan. 12—The Badger Motor Boat Co. of Racine, Wis., has added new capital and is increasing the capacity of its plant. The new officers are: President, Herman Falkenrath; vice-president, John Trumbull; secretary and general manager, William Draeger; treasurer, Robert Svitavsky.

EXTEND GLASS PLANT

KANAWHA CITY, W. VA., Jan. 9—The Libby-Owens Sheet Glass Co. will erect additional buildings here for the manufacture of sheet glass for automobile bodies to cost $2,000,000.

American-6 Builds Plant in Carolina

ATLANTA, GA., Jan. 12—A new plant to manufacture American Balanced Six cars for exclusive distribution to dealers in the Southern territory is being erected at Greensboro, N. C., according to Leroy E. Humphries, distributer of that car in the Georgia territory. Humphries has just returned from Greensboro, where he inspected the new plant.

The company's main plant is located at Plainfield, N. J., and announcement is made that the new Southern plant will assure dealers in Dixie an equitable distribution of cars in all seasons, and will also result in materially lowering freight rates. It is thought that the new factory will be ready for operation about March 1.

Humphries has announced that he will shortly erect a new building here to house the Georgia branch of the American company.

Baker Gun Co. to Specialize in Parts

BATAVIA, N. Y., Jan. 12—The Baker Gun & Forging Co. of this city has disposed of the gun branch of its business, and in the future will devote all of its facilities to the production of automotive parts. The line of control and brake lever sets and universal joints manufactured heretofore will be continued, and other devices will be added from time to time. For the past four or five years the concern has been furnishing control and brake lever sets to truck manufacturers, and it is now prepared to furnish all types of controls with H gate or ball type. The line of universal joints comprises four sizes, and these joints are furnished complete with propeller shaft.

GILLETTE DOUBLES PLANT

EAU CLAIRE, WIS., Jan. 12—The Gillette Rubber Co. of Eau Claire, Wis., has completed additions and installation of new equipment providing a 50 per cent increase in capacity. On Jan. 2 the factory for the first time exceeded the 1000-mark in casing output. In addition, 1500 inner tubes and 200 raincoats were produced in a single day. The company also maintains a large machine shop in which tire and rubber machinery is manufactured for other rubber concerns.

INCORPORATE ANGERS CO.

MILWAUKEE, Jan. 12—The Angers Mfg. Co. of Milwaukee has been incorporated for $10,000 by Charles S. and Fred J. Angers and Albert T. Pike.

Begin Construction of Eaton Axle Plant

DETROIT, Jan. 10—The Eaton Axle Co. has started work on the construction of its plant at Cleveland and expects to be in production in the early summer. The company is capitalized at $5,000,000, and the engineering department is headed by J. O. Eaton, former president of the Torbensen Axle Co., and V. V. Torbensen, patentee of the original gear type of truck axle and one of the founders of the Torbensen Axle Co.

The company will manufacture a bevel-gear passenger car axle of conventional design and a truck axle of the internal gear type, perfected recently by Torbensen. Shortage of axles to supply the demands of the industry, Eaton said, brought about the formation of the company. He declared such condition existed in the axle field that the new company would be unable to accept all of the business offered at the start.

TO MAKE TRAILERS

LOUISVILLE, KY., Jan. 9—A two-acre tract of land at Fourteenth and Hill streets was purchased and the deeds recorded to-day by the Byron Construction Works, on which a $40,000 plant for the manufacture of automobile trailers will be built. The factory will be a modern brick structure, one story high, and occupying 16,000 sq. ft. of ground. Work of construction is expected to begin this month.

The plant will have a capacity of 1000 trailers annually, each valued at about $1,000. It is capitalized at $175,000. Those associated in the project include O. E. Byron, J. Stoddard Johnston, Richard M. Dean, Caldwell Norton, Robert F. Vaughan, Joseph Burge and Tampton Aubuchon.

TO MAKE SPARK PLUG

SPARTA, WIS., Jan. 12—The Perron Co., Inc., of Sparta, Wis., has been organized to manufacture a patented spark plug designed by A. J. Perron of Sparta. A plant is being equipped and will be in production by Feb. 1. Officers of the new company are: President, A. J. Perron; vice-president, H. W. Jefferson; secretary, Sid N. Smith; treasurer, E. G. Kowitz.

GEMCO CO. BREAKS GROUND

MILWAUKEE, Jan. 12—The Gemco Mfg. Co., Milwaukee, maker of automotive equipment, has broken ground for a 1-story brick and steel manufacturing addition, 50 x 156 ft., which will cost about $75,000 equipped. Further extensions will be made during the spring and summer to supplement enlargement throughout 1919. Grant F. Discher is president and general manager.

MAKE TEXAS TRACTOR

SWEETWATER, TEX., Jan. 9—The Armstrong Farm Tractor Co. has acquired a site here for a tractor manufacturing plant.

Calendar

SHOWS

January—New York, International Automobile Mfrs. Congress.

Jan. 12-17—Dayton, O. Annual Automobile Show. Borchers Auto Co's. new building. Dayton Auto Trade Assn. H. C. Phelps, Director, and B. J. Borchers, Chairman.

Jan. 13-17—Erie, Pa. Overland-Erie Garage, Erie Automobile Dealers' Association. A. L. Nelson, Manager.

Jan. 17-24—Cleveland, Nineteenth Annual Automobile Show, Cleveland Automobile Mfrs.' and Dealers' Assn. Wigmore Coliseum.

Jan. 17-24—Hartford, Conn., Shows, State Armory, Annual Exhibition. Arthur Fifoot, Manager.

Jan. 18-24—Worcester, Mass. Automobile Show, Worcester Automobile Association.

Jan. 19-25—Oakland, Cal. Annual Motor Show Alameda County Automobile Trade Assn. Civic Auditorium. Robert W. Martland, Manager.

Jan. 19-25—Milwaukee, Wis. Auditorium, Annual Motor Exhibition. Milwaukee Automobile Dealers, Inc.

Jan. 22-24—Lancaster, O. Annual Automobile Show, Fairfield County Auto Trades Assn. Sherman Memorial. W. H. Payne, Manager.

Jan. 24-31—Chicago, Ill. Coliseum. Cars: Drexel Pavilion, National Automobile Chamber of Commerce. S. A. Miles, Manager.

Jan. 24-31—Chicago, International Amphitheater, Commercial cars and accessories.

Jan. 31-Feb. 6—Kansas City, Mo. Annual Exhibition. Overland Bldg. E. A. Peak, Manager.

Jan. 31-Feb. 7—Minneapolis, Minn. Twin City Automobile Truck, Tractor and Industrial Show. Overland Bldg.

February—Chicago International Automobile Mfrs.' Congress.

February—Deadwood, S. D. Annual Show. Deadwood Business Club. F. R. Baldwin, Manager.

Feb. 2-7—Rochester, N. Y. Rochester Automobile Trades Assn., Exposition Park. Benjamin L. Peer, Manager.

Feb. 2-7—Toledo, Ohio. Annual Automobile Show, Terminal Auditorium.

Feb. 3-7—Wilmington, Del. Automobile Show. Hotel du Pont.

Feb. 3-7—Baltimore, Md. Automobile Show, Baltimore Automobile Dealers Assn. Fifth Regiment Armory. John C. O'Brien, Manager.

Feb. 9-13—Charlotte, N. C. Automobile Show, Charlotte Automobile Trade Assn. Lee Folger, Chairman, Show Committee.

Feb. 9-14—Cedar Rapids, Ia. Annual Automobile Show, Linn County Motor Trades Bureau. Auditorium. W. J. Hutchings, Chairman, and H. M. Davis, Secretary.

Feb. 9-14—Poughkeepsie, N. Y. Annual Automobile Show. Poughkeepsie Auto Club. Armory. George A. Coleman, Manager.

Feb. 9-14—Salt Lake City. Annual Automobile Show. W. D. Rishel, Manager.

Feb. 9-14 — Nashville, Tenn. Nashville Automobile Trade Association.

Feb. 10-13—Fargo, N. D. Barry Bldg. Fargo-Moorehead Automotive Trade Assn. H. L. Wilson, Director.

Feb. 10-15—Quincy, Ill. Annual Automobile Show.

Feb. 14-22—San Antonio, Tex. Automobile Show. San Antonio Automobile Trade Assn. W. A. Williamson, Manager.

Feb. 16-21—Des Moines, Ia. Annual Automobile Show. Des Moines Automobile Dealers' Assn. Ford Factory, Dean Schooler and C. G. Van Vliet, managing.

Feb. 21-28 — San Francisco. Fourth Annual Automobile Show. Exposition Auditorium. Motor Car Dealers' Assn. G. A. Wahlgreen, Manager.

Feb. 21-28 — Louisville, Ky. Twelfth Annual Exhibition. Louisville Automobile Dealers' Assn. First Regiment Armory.

Feb. 23-28—Elmira, N. Y. Elmira State Armory. Elmira Automobile Club. H. S. Bryan, Manager.

Feb. 22-28—Ottawa, Ontario. Motor Show.

Feb. 23-28—Car Show. Hippodrome Building. Dealers' Motor Car Assn. M. O. Wilkins, Manager.

Feb. 23-28—Truck Show. Armory. Dealers' Motor Car Assn. M. O. Wilkins, Manager.

Feb. 23-28—Grand Rapids, Mich. Motor Car Show. Furniture Exposition Building. M. D. Elgin, Manager.

Feb. 23-28—Duluth, Minn. Automobile Show. Duluth Auto Trades Assn. W. F. Daly, Director.

March—New York. Aeronautical Exposition. Seventy-first Regiment Armory. Manufacturers' Aircraft Assn.

Mar. 1-6—Springfield, Mass. Annual Automobile Show. Auditorium. Springfield Automotive Dealers' Assn. Robert H. Clark, Manager.

Mar. 1-6—St. Joseph, Mo. Annual Automobile Show. St. Joseph Automobile Show Assn. Auditorium. John Albus, Manager.

Mar. 1-6—Grand Rapids, Mich. Truck Show. Furniture Exposition Bldg. M. D. Elgin, Manager.

Mar. 1-7—Springfield, Mass. Annual Automobile Show. Springfield Automobile Dealers' Assn. Harry Stacy, Secretary.

Mar. 1-8—Seattle. State Armory. Motor Car Dealers' Assn. William J. Coyle, Manager.

Mar. 7-13—Muskegon, Mich. Automobile Show. Muskegon Auto Business Men's Assn. J. C. Fowler, Manager.

Mar. 10-13—Lebanon, Pa. Annual Motor Show. Automotive Trade Association of Lebanon. James Furniture Store-Bldg. J. Paul Enck, Manager.

Mar. 12-20—Boston, Mass. Annual Automobile Show. Mechanics' Building.

Mar. 15-20—Great Falls, Mont. Automobile Show. Montana Automobile Distributors' Association.

Mar. 20-27—Trenton, N. J. Annual Automobile Show. Armory. Trenton Automobile Dealers' Assn. John L. Brock, Manager.

FOREIGN SHOWS

January — Glasgow, Scotland. Scottish Motor Exhibition.

February—Manchester, England. North of England Motor Exhibition.

Feb. 22-March 6—Birmingham, England. British Industries Fair.

March—London, England. Motor Boat Marine and Stationary Engine Exhibition.

March—Adelaide, Australia. All Australian Exhibition of motor vehicles, airplanes, engines and automotive equipment.

March 1-15—Lyons, France. Automotive Products, Lyons Industrial Fair.

March 20-27—Pittsburgh. Motor Square Garden. Automotive Association, Inc. John J. Bell, Manager.

April or May—London, England. Commercial Vehicle Exhibition. Olympia.

April 3-May 4—Buenos Aires. Exposition of U. S. manufacturers.

July—London, England. International Aircraft Exhibition. Olympia. The Society of British Aircraft Constructors.

TRACTOR SHOWS

Feb. 2-14—Wichita, Kan. Tractor and Farm Machinery Forum, Wichita Thresher-Tractor Club.

Feb. 16-21—Kansas City, Mo. Fifth Annual Kansas City Tractor Club. Guy H. Hall, Manufacturer.

CONTESTS

August, 1920—Paris, France. Grand Prix Race. Sporting Commission Automobile Club of France.

June, 1920—Omaha, Neb. Reliability Truck Tour.

CONVENTIONS

Feb. 9-13 — Louisville, Ky. Seventeenth Annual Convention American Road Builders' Assn., Tenth American Good Roads Congress, and Eleventh National Good Roads Show.

May 13-20, 1920—San Francisco. Seventh National Foreign Trade Convention.

S. A. E. MEETINGS

Jan. 28—Chicago, Truck and Tractor Meeting. Hotel La Salle.

Feb. 12—Kansas City, Mo. Tractor Dinner. Hotel Baltimore.

ALFRED SCHMID DIES

EAST PITTSBURGH, Jan. 15—The recent death of Albert Schmid, of the Westinghouse Electric Co., recalls a number of the achievements for which he was responsible in the electrical field. He entered Westinghouse employ in the early 80's, and was the first chief engineer of the company, and later its general superintendent. Principal of his inventions were the film of oxide to insulate from each other steel laminations, and a design for electrical machines, which became at once the typical Westinghouse structure. He also did much to develop the gas and gasoline engine, his latest work being a carbureting system for internal combustion engines. A long list of inventions stands to his credit.

WILL AUCTION MOTORCYCLES

NEW YORK, Jan. 15—Twenty-three Indian motorcycles with side cars, recently condemned by the Motor Transport Corps, will be sold at public auction at the Post Garage, Fort Jay, Governor's Island, at 1 p. m., Wednesday, Feb. 4. The terms are cash, and the property must be removed by the purchaser within twenty-four hours.

NEW BERGOUGNAN CORD

NEW YORK, Jan. 15—The Bergougnan Rubber Corp., Trenton, N. J., has placed on the market a new cord tire in sizes up to 40 x 8. The tire has a black tread with gray side walls, and remarkable wearing qualities are claimed for it.

BUILD "DUMMY" OBSERVER

WASHINGTON, Jan. 15—A "dummy" observer has been built by the Bureau of Standards for the flight test branch of the Engineering Division of the Air Service at McCook Field, Dayton, and consists of a board fully equipped with all the necessary instruments to enable the taking of more rapid and accurate performance tests of airplanes.

BREWER IN NEW JOB

CHICAGO, Jan. 15—Walter R. Brewer, for 12 years manager of the Delco department of the Kellogg Switchboard & Supply Co., Chicago, has resigned to take charge of sales of the automotive products for the Electric Cable Co.